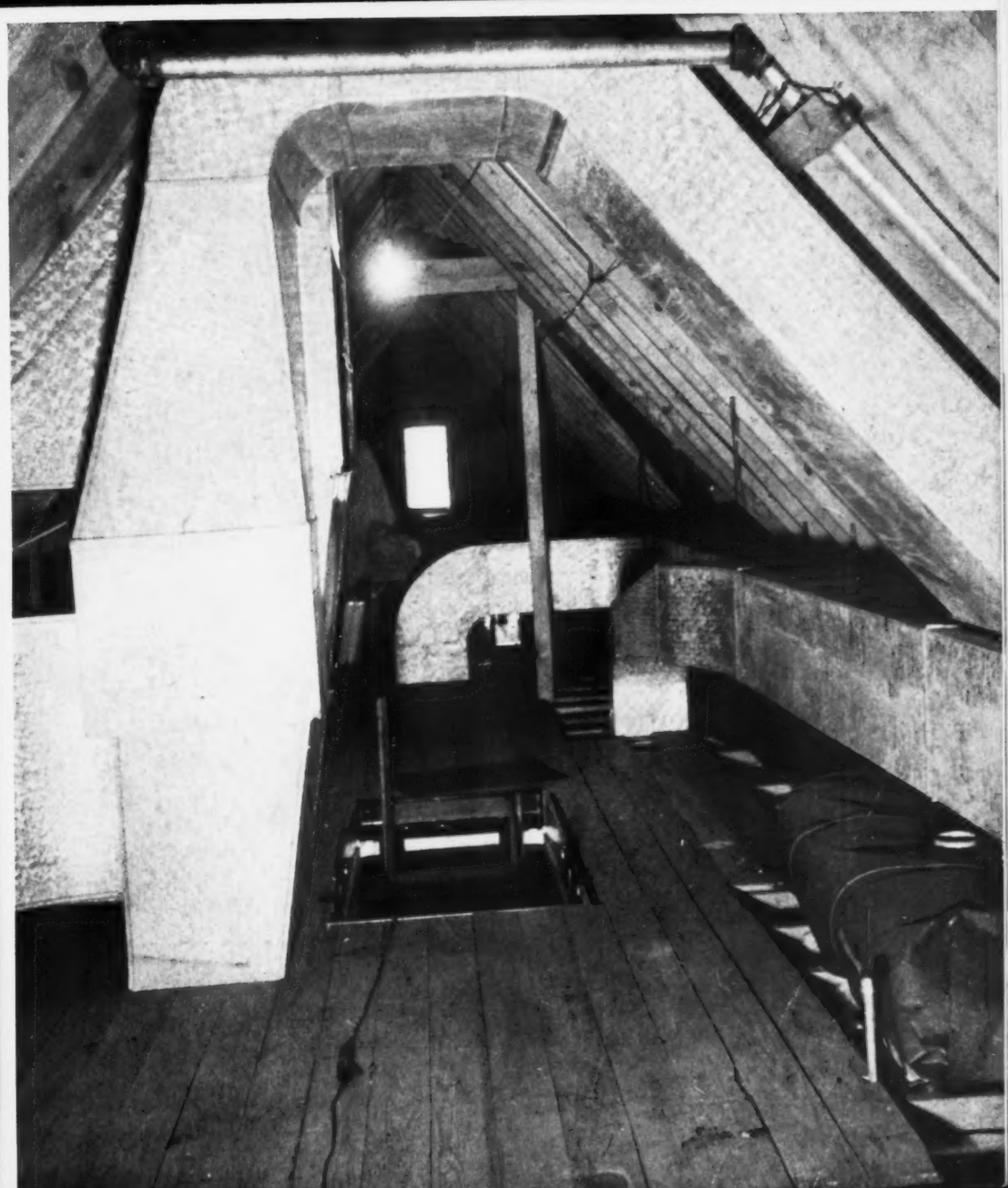
AMERICAN ARTISAN

RESIDENTIAL AIR CONDITIONING
WARM AIR HEATING • SHEET METAL CONTRACTING



JUNE
1939

ESTABLISHED
1880

LAMNECK SERIES 700 SYSTEM
PREFABRICATED DUCT AND FITTINGS

PREDETERMINED PROFIT

★

KNOW YOUR COSTS BEFOREHAND —AVOID UNFORESEEN LOSSES

• When you install Series 700 System of Prefabricated Duct and Fittings you know *beforehand* to the cent what the material will cost. The price of every part you use is plainly marked in the Lamneck Series 700 Catalog.

Figuring your labor costs, too, is a matter of simple arithmetic because Series 700 is so simple and easy to install under any and all conditions that guess work and doubt are eliminated. You can estimate with definite assurance of an unfluctuating profit because you avoid the uncertainty of unforeseen losses that frequently attend the making of your own duct. Absence of forming and setting down of seams, elimination of laborious fitting and doing away with wasteful cutting are features of Series 700 which safeguard profits.

MORE TIME FOR BUILDING YOUR BUSINESS

Series 700 System of Prefabricated Duct and Fittings saves you hours of time required for laborious designing, making and fitting of your own product. This precious time you can devote to more profitable advantage in developing sales and building your business.

Your key to bigger profits is to concentrate your time and energies on merchandising. You'll be free to do so if you place on Series 700 the burden of solving your production and installation problems.

Write for name of your nearest Distributor.

LP INC.

LAMNECK PRODUCTS, INC.

414 DUBLIN AVENUE • COLUMBUS, OHIO

PREFABRICATED DUCT AND FITTINGS FOR ALL TYPES OF RESIDENTIAL WARM AIR HEATING AND AIR CONDITIONING SYSTEMS

How Furblo CUTS YOUR INSTALLATION COSTS - -

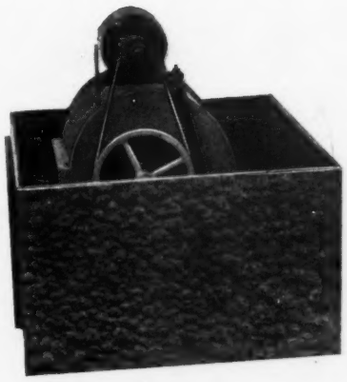


Fig. 1
(See text)

Fig. 2
(See text)

Fig. 3
(See text)

Your installers spend too much time setting up most blowers. FURBLO saves this wasted time—saves expense—saves money—and thus makes more profit for you.

The FURBLO 5000 Series comes to you with the cabinet completely assembled in two easy-to-handle, rigidly constructed sections.

Figure 1 shows the blower with the convenient top motor mounting (originated by FURBLO) and with the bottom cabinet section in position. See how easily and quickly your installer can reach every part during installation with this FURBLO sectional cabinet.

Figure 2 shows the top cabinet section in place. Your installer can instantly shift the access door to any convenient side of the cabinet. Dealers tell us that this feature alone makes FURBLO worth more in saving of installation cost than any blower they have ever used.

Figure 3 shows the 5000 Series FURBLO Cabinet completely assembled. This is the only furnace blower that protects you and your customer with a 5-year guarantee. One dealer writes: "I can get a better price—make more profit—with FURBLO 5000 Series than with any other blower because home owners want the direct factory guarantee."

PRECALCULATED TABLES OF ROOM HEAT LOSSES

For rooms from 7 ft. x 7 ft. up to 16 ft. x 32 ft. with 1, 2 and 3 sides exposed, with and without cold ceilings and with 1 to 8 windows. They are published in FURBLO ENGINEERING BULLETIN No. 23 (1939 Series).

■■■■■■ MAIL THE COUPON NOW ■■■■■■

Furblo Co., Hermansville, Mich.

Tell me all about the FURBLO BULLETINS and ENGINEERING SERVICE; also send catalog and prices.

The jobber through whom I buy blowers is (name).....

(address) .....

My name .....

Address .....

AAJune'39 .....

AMERICAN ARTISAN

WITH WHICH ARE MERGED

FURNACES AND SHEET METALS

AND

Warm-Air Heating

Covering All Activities in Residential Air Conditioning and Small Commercial Cooling, Warm Air Heating, Sheet Metal Contracting and Fabricating

J. D. Wilder, Editor — A. A. Kennedy, Assistant Editor

Vol. 108, No. 6 — June, 1939 — Founded 1880

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In This Issue

RESIDENTIAL night air cooling systems, as typified by our cover picture, and its offspring comfort cooling by air movement, as discussed in the article on page 50, during the last three years has opened a new field to contractors able to visualize the possibilities of this low cost comfort system. For those who cannot afford refrigerated cooling, air cooling offers definite possibilities.

•

And in connection with cooling, we call attention to the excerpted paper on page 44 in which the importance of Effective Temperature in cooling calculations is understandably set forth.

•

From the secretary of the secretaries' association comes the outline of a proposed new contractors' national association. The secretaries of the state associations welcome discussion by contractors. If you do not have the name and address of the secretary of your state association, we will gladly supply the information.

•

Every contractor, no matter what he sells, should be interested in the new program of FHA, to be launched in June, to increase the amount of work in modernization. The outstanding feature of this new program is the amount of helpful advertising material made available free of cost. The article on page 30 tells about all the material and how it may be obtained.

•

Two unusual articles appear in this month's Sheet Metal Section—one on the unique pent-room ventilating systems in the G-Mens building in Washington (page 55); the other (page 62) the manufacture of lanterns and other artistic products by Panza in Hollywood.

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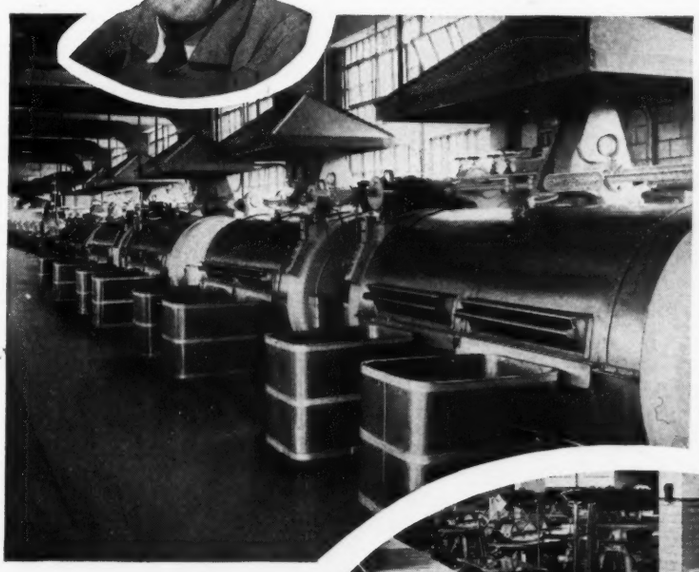
More than 8,000 Copies of this Issue are being distributed

Look before you Creep!

By TIM SHEARS



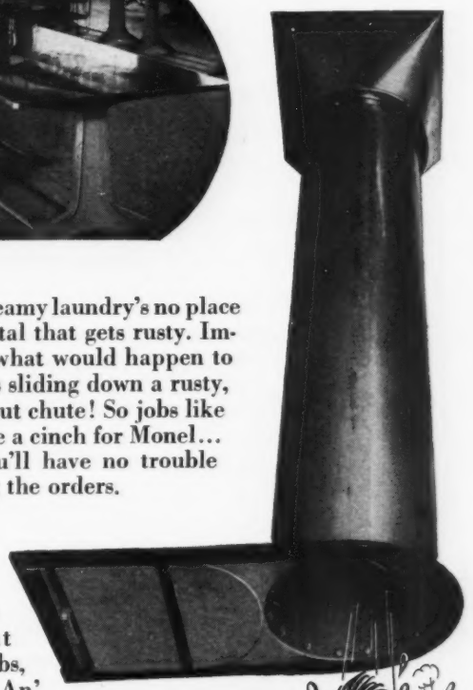
ON ACCOUNT of what happened when I was new in the sheet metal business I've always had a healthy respect for laundries. We're working on a job in one of 'em an' I'm holding a dolly while another guy does the rivetting. First chance I get I sneak off for a smoke.

Just as I'm taking my second puff I hear the foreman coming. So quick, but quiet, I creeps into a little closet. Whoosh! Before I know it I've slid down a chute clean into a washer!

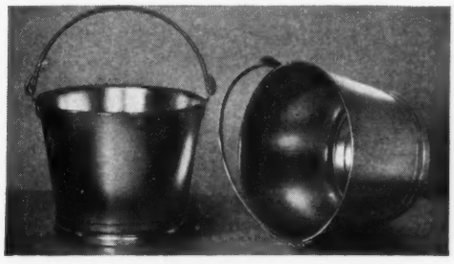
However, there's another reason why I've a healthy respect for laundries: There's plenty of jobs in 'em for a smart sheet metal man, as these pictures show:

1. This first one'll tip you off on how to make the money. Most laundries use washers like these...made of Monel. They find that Monel washers keep clean and smooth inside, so are easy on clothes. Also, they save a pile of dough on power, water, soap an' etcetera. So here's what *you* do:

2. When you call on the laundries remember they need trucks like you see in the first picture, an' also table tops like these. All right, what are you going to make 'em out of? Same as the washers, of course . . . Monel. After all, a laundry owner don't spend thousands of dollars on Monel washers, *then take chances with trucks that get rusty an' tables that splinter!*



3. A steamy laundry's no place for metal that gets rusty. Imagine what would happen to clothes sliding down a rusty, worn-out chute! So jobs like this are a cinch for Monel... an' you'll have no trouble getting the orders.



4. Turning out Monel buckets is a paying proposition for two reasons: First, because they're simple to make. Second, because the laundries like these Monel buckets. They're easy to keep clean, can't rust, won't leak, and are good for a lifetime of hard service.

If there's anything you want to know about making any of these jobs, just drop me a line. An' keep your eyes open for this kind of business. The laundries are full of it . . . an' laundry owners want Monel.

TIM SHEARS

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street New York, N. Y.

"Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.

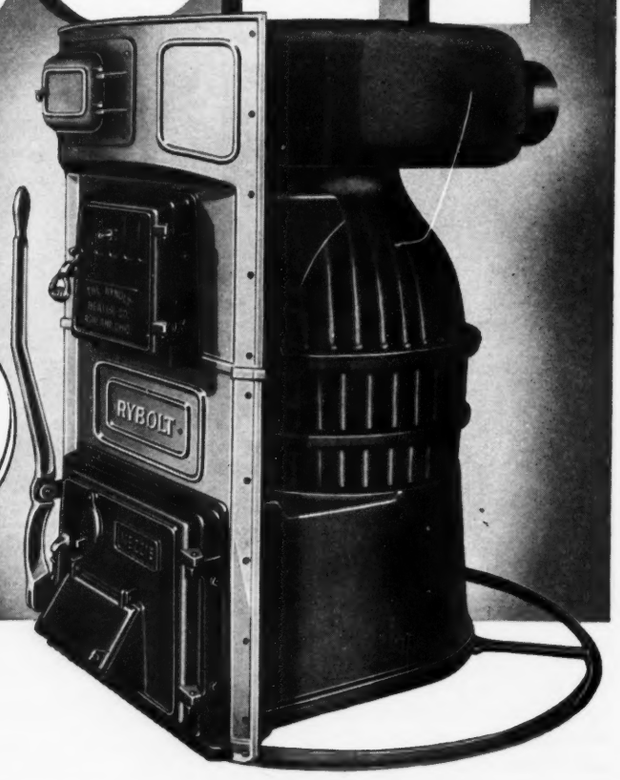
P. S. *When you call on the laundries, look out for strange doors . . . they might lead to chutes!*

RYBOLT

CAST IRON FURNACE

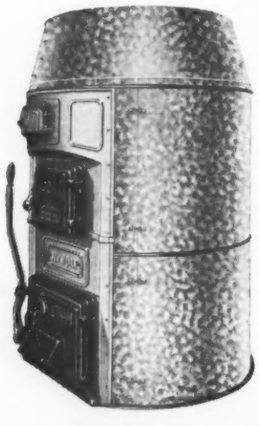
SERIES 15

A finer furnace for the hard-to-please CUSTOMER



You have customers who are hard to please with anything less than the best. In considering the purchase of a furnace they want utmost efficiency, convenience and economy.

To such customers the RYBOLT Series 15 Furnace will make a strong appeal because it is designed and built to meet the most exacting modern requirements. Nothing has been spared to make it a quality furnace through and through.



From every standpoint—heat-power, capacity, durability, convenience, cleanliness, advanced features and beauty—you will find the Series 15 an outstanding value that will arouse the enthusiasm of your most particular customers. Yet the price is so reasonable that it offers no barrier to quick and ready sales.

The culmination of more than a quarter century of fine furnace building, the RYBOLT Series 15 gives you the edge on competition and the wedge to bigger profits. Write for copy of the folder, "The Furnace of Today."

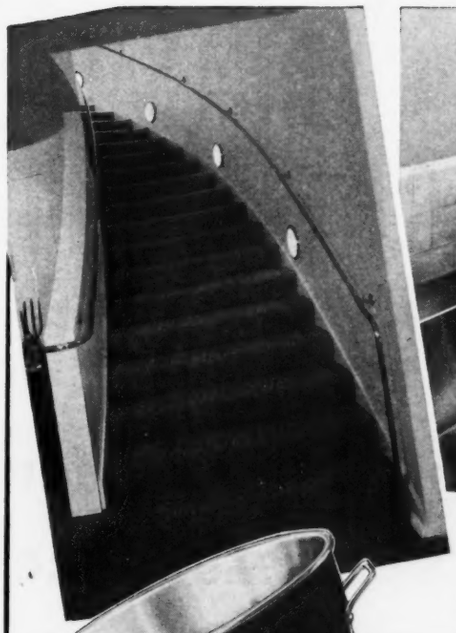
Weight Where Weight Counts

A good furnace today is not sold by the pound. Yet weight has a definite bearing on quality if it is distributed in the essential places.

RYBOLT Series 15 has extra weight where weight counts most—in its extra large grates, in the firepot and in the feed section. This means greater strength and dependability as well as maximum heat-power and consequent fuel economy.

THE RYBOLT HEATER COMPANY

615 MILLER STREET • ASHLAND, OHIO



U·S·S STAINLESS SINKS *for hotels, restaurants, clubs, hospitals and homes offer profitable business in this easy-to-clean metal.*
U·S·S STAINLESS HANDRAILS *illustrate one of many applications in household trim. Opportunities to sell stainless in every new home.*
U·S·S STAINLESS BUCKETS *bring worthwhile profits to a sheet-metal worker who supplies them by the dozens to textile plants.*
U·S·S STAINLESS STORE FRONTS *are gaining popularity because of their bright, modern appearance. Get your share of this business.*

Ask for MORE BUSINESS *. . . and you'll get it!*

THAT'S one of the cardinal principles of selling. For many years retail salesmen have been practicing it. When you buy shaving cream, the drug clerk asks you if you need razor blades. You willingly spend a little more for shoes when the salesman points out that this pair will last twice as long as that.

And this principle applies equally to you as a seller of sheet metal goods. When you quote on any metal product to which appearance and long life are important, ask the buyer if it wouldn't be worth spending a few dollars more for stainless steel. Tell him how stainless lasts a lifetime, how it never rusts in ordinary service, how it is always easy to keep clean and attractive.

In suggesting stainless steel, you are actually serving your customer, as well as building up the dollar volume of the sale. For in so many metal products, stainless gives the buyer far more for his money.

The trend toward stainless is gaining momentum so rapidly that it will pay you to establish yourself now as the stainless specialist in your territory. Write today for complete information on U·S·S Stainless Steel—how to fabricate equipment of this money-making metal and sell it at a profit.

USS

STAINLESS STEEL

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York*
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
NATIONAL TUBE COMPANY, *Pittsburgh*
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Products Company, New York, *Export Distributors*
Scully Steel Products Company, Chicago, *Warehouse Distributors*

UNITED STATES STEEL

THIS CRESCENT HACKSAW

is designed for severe service

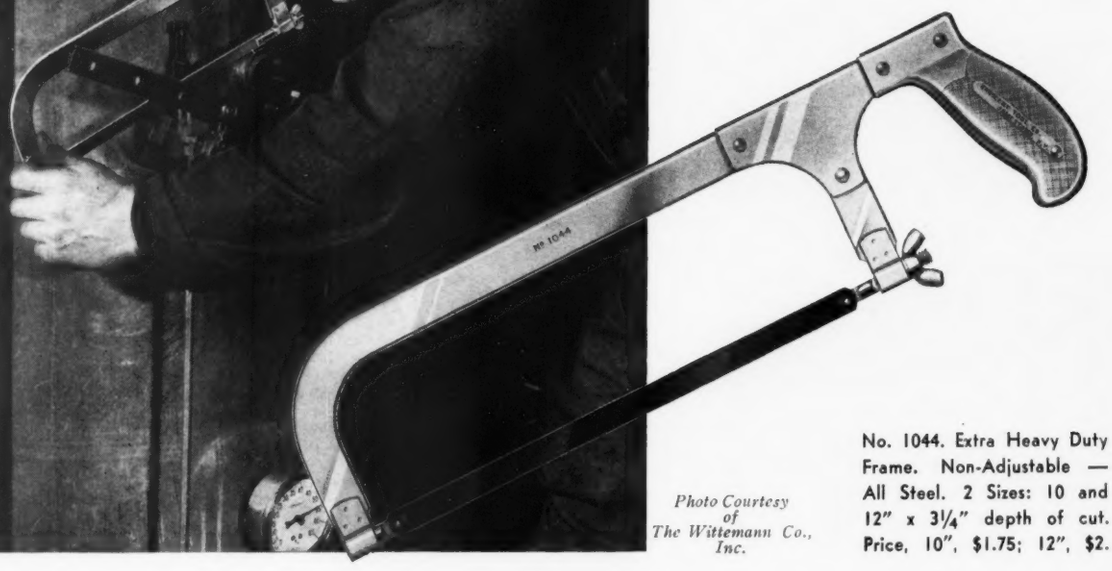


Photo Courtesy of The Wittemann Co., Inc.

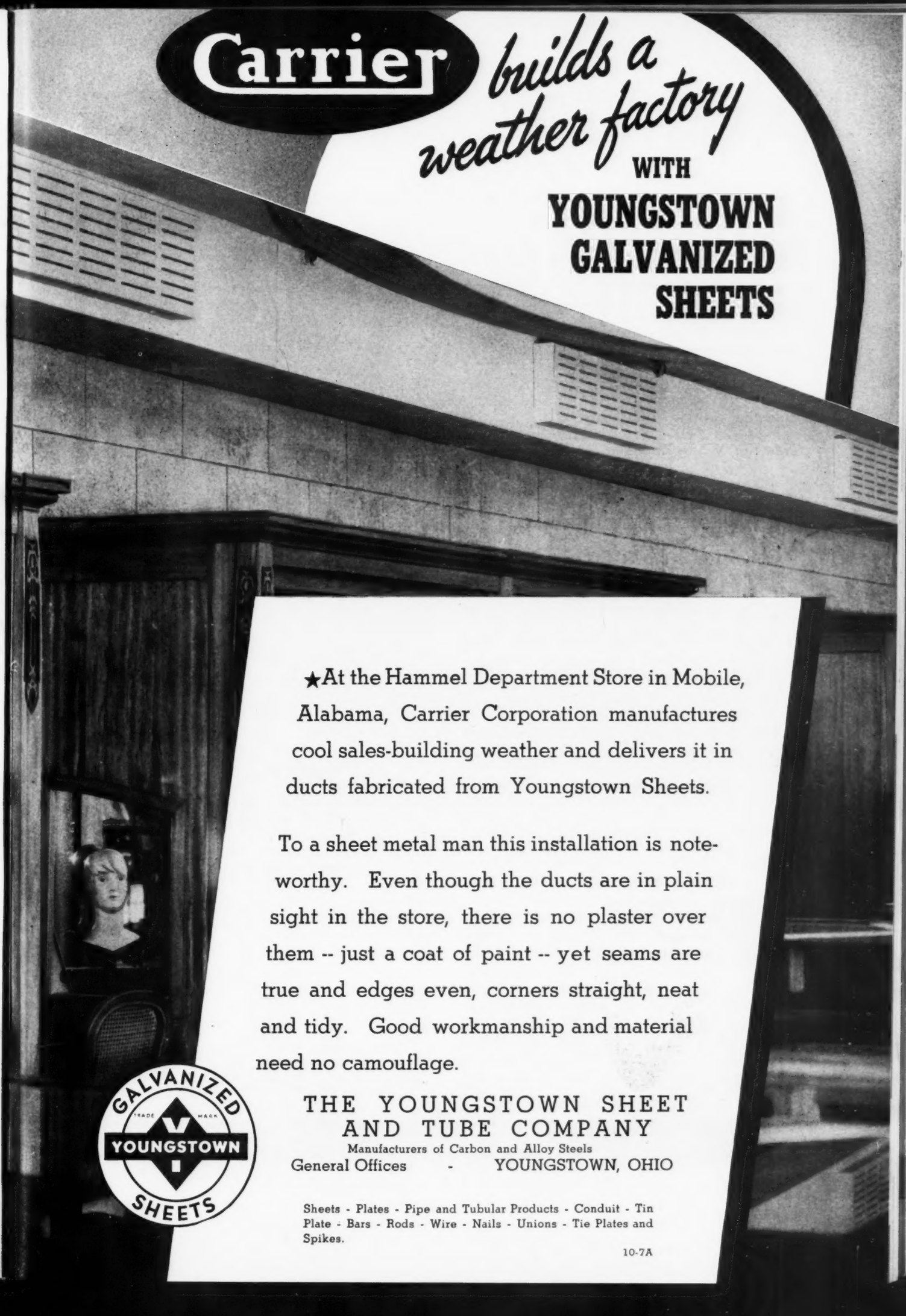
No. 1044. Extra Heavy Duty Frame. Non-Adjustable — All Steel. 2 Sizes: 10 and 12" x 3¼" depth of cut. Price, 10", $1.75; 12", $2.

You don't have to "pull your punches" with this *Extra Heavy Duty* Crescent Hacksaw Frame. No. 1044 is *all steel* . . . ruggedly constructed with a solid (non-adjustable) frame that has plenty of "backbone". It's an ideal hacksaw frame for severe service because it will withstand hard use—and abuse—and still give you the best that's in your blades.

Crescent Hacksaw Frames are made in a variety of styles, both adjustable and solid frames, in all-steel, pistol-grip types and also with wood and composition handles. All moving parts are screw-machine made, thus assuring smooth operation with absolutely no binding. All Crescent Frames are handsomely finished in heavy nickelplate. Sold by hardware and industrial distributors everywhere. A copy of the new Crescent catalog showing the full line of Crescent and Smith & Hemenway tools will be sent upon request.

CRESCENT TOOL CO., JAMESTOWN, N. Y.

CRESCENT and Smith & Hemenway TOOLS



★At the Hammel Department Store in Mobile, Alabama, Carrier Corporation manufactures cool sales-building weather and delivers it in ducts fabricated from Youngstown Sheets.

To a sheet metal man this installation is noteworthy. Even though the ducts are in plain sight in the store, there is no plaster over them -- just a coat of paint -- yet seams are true and edges even, corners straight, neat and tidy. Good workmanship and material need no camouflage.

GALVANIZED TRADE MARK YOUNGSTOWN SHEETS

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

General Offices - YOUNGSTOWN, OHIO

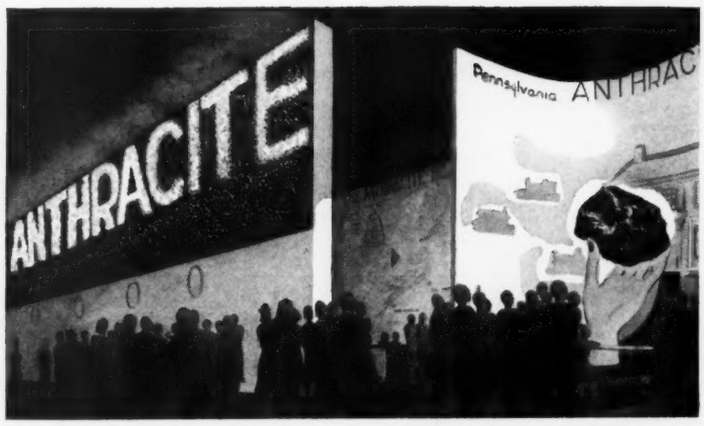
Sheets - Plates - Pipe and Tubular Products - Conduit - Tin Plate - Bars - Rods - Wire - Nails - Unions - Tie Plates and Spikes.

10-7A

At the World's Fair

ANTHRACITE EXHIBIT

See the "Hand of Comfort"
See the "Wall of Protection"
See the "Hall of Manufacturers"
See the "White Room"



THE HAND OF COMFORT AND THE WALL OF PROTECTION

then you will see why Anthracite IS the fuel of tomorrow for the home of today

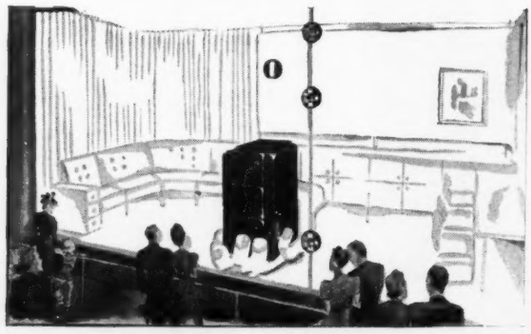
ONE of the most unique displays at The New York World's Fair is the Exhibit of Pennsylvania Anthracite in The Home Building Center. It is as modern as tomorrow and rightly so, for Anthracite is the most modern of all home heating fuels.

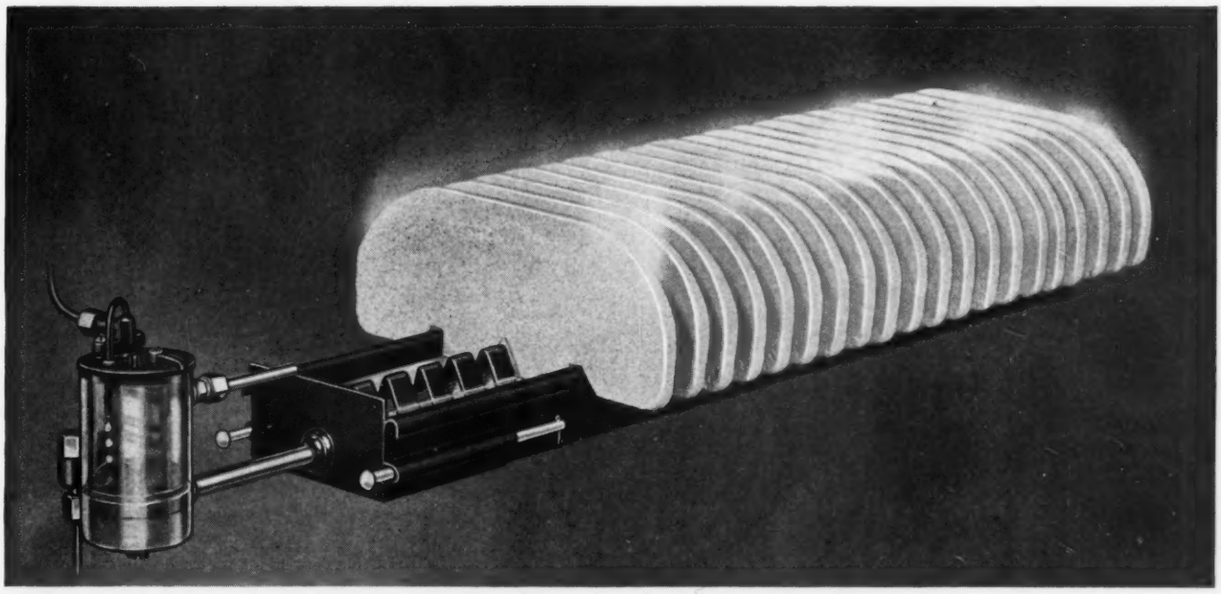
In this impressive Exhibit, new materials, new ways of lighting, of display—tell a most interesting and convincing story of Anthracite's 7 star advantages for home heating.

See why modern equipment more than ever makes Anthracite the safe, convenient, dependable fuel, with utmost economy, for the home of today or "the world of tomorrow." Anthracite Industries, Inc., Chrysler Building, New York, N. Y.

Save with Pennsylvania ANTHRACITE
(HARD COAL)
THE ONLY 7 STAR FUEL

THE HALL OF MANUFACTURERS


THE WHITE ROOM



Scientific Humidification

At New Low Prices

Here's news for jobbers and dealers who would like to sell humidification but have never been shown a feasible program.

Automatic June Vapor Diffusers with inexpensive Flotrol controls bring scientifically correct humidification within the reach of every home. And you can't go wrong on correct capacities and proper installations because these two vital factors have been reduced to a simple chart that any salesman or workman can understand perfectly.

The Flotrol control is really a fine precision-built instrument. With very little attention on the part of the owner, it maintains the proper humidity level at all times.

The vapor diffuser is the same as is used on higher-priced completely automatic Humigrad installations. Every plate is equal to 50 sq. in. of water surface, insuring ample capacity under all installation and operating conditions.

For complete details on this important new profit opportunity write to Monmouth Products, Inc., 1933 E. 61st St., Cleveland, Ohio.

AUTOMATIC JUNE

GRADUATED HUMIDITY CONTROL

Century's Motor Specialization + *Correctly Engineered Application* = Satisfaction and Economy

To Assure Maximum Satisfaction

Century Builds *Specialized* Motors for Every Air Conditioning Job!

AIR CONDITIONING, with its many ramifications, calls for specialized motors plus specially engineered applications.

When high starting torque is an advantage, where the ability to start and accelerate to full speed easily is important, where quiet operation is a sales feature, where protection against moisture in damp basements is of importance — you'll find leading manufacturers using Century Motors.

And Century specialized motors plus correct application eliminate costly over-motoring and assure economy in installation and operation, and more satisfactory service on the job.

Century specialized manufacturing enables the Century Motor Specialist to offer a motor designed and built to meet the requirements of the application.

As a result manufacturers, dealers and users of air conditioning and heating equipment have found that Century motors offer greater profit, satisfaction and economy for all.

There's a Century Motor Specialist near you — ready and anxious to give you the benefit of his *years* of experience. Call him.

for

Your Convenience

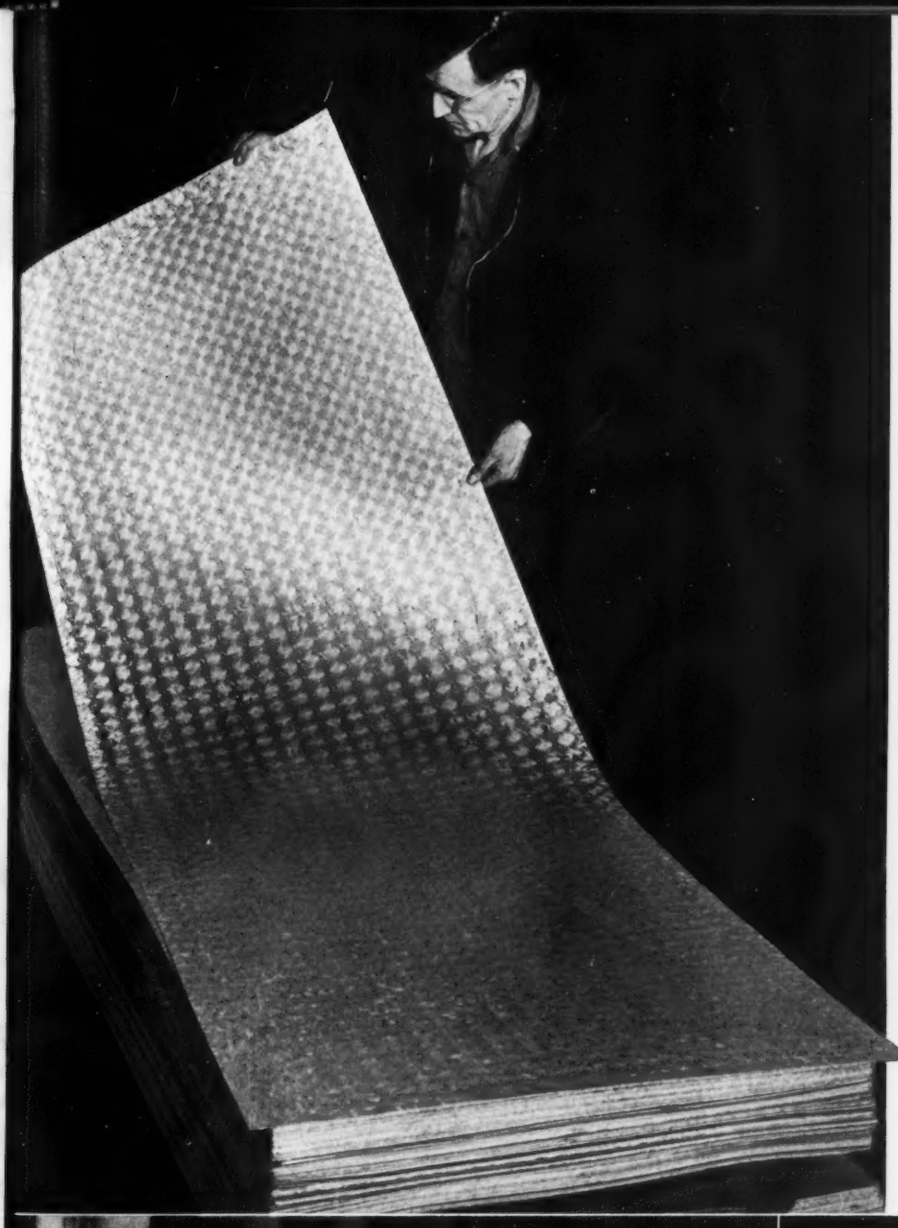
Century Motor Specialists are located in these key centers:

Atlanta • Baltimore • Boston
Buffalo • Chicago • Charlotte
Cincinnati • Cleveland
Dallas • Denver • Davenport
Detroit • Houston • Indianapolis • Kalamazoo • Kansas City
Los Angeles • Milwaukee
Minneapolis • New Orleans
New York • Omaha
Philadelphia • Pittsburgh
Rochester • Salt Lake City
San Francisco • Spokane
Seattle • Tulsa

CENTURY ELECTRIC COMPANY
1806 Pine Street - - - - - - - St. Louis, Mo.

Century MOTORS

One of the Largest Exclusive Motor Manufacturers in the World



"We Combine Attractive Appearance with Quality"

"Much of our work calls for severe bending and we find that Superior Sheets withstand these operations exceptionally well. It's important too that we turn out attractive work as well as quality work. We find that Superior Checker Coat provides both. We also do a lot of electric welding instead of double seaming which makes for a neater, stronger job," says the manager of a well-known sheet metal products plant.

Every shop test proves the adaptability and high degree of workability of Superior Sheets. These advantages go hand in hand with economy. To enjoy both use Superior Galvanized Sheets. Distributors in principal cities.

THE SUPERIOR SHEET STEEL CO. • CANTON, OHIO
Division of Continental Steel Corp., U. S. A.

THE SUPERIOR SHEET STEEL CO. CHECKER COAT S TRADE MARK CANTON, O.

SUPERIOR

OPEN HEARTH STEEL SHEETS

Safe!

The spectators in the stands get a big thrill when a player slides in at the plate, but given his choice the runner would rather come in standing up. Sliding can not only be dangerous, but often as not the decision goes the wrong way.

You in your business and we in ours are also called upon to decide whether to take a chance or to "play the game" safe. Competition and the opportunity to make a few dollars extra profit constantly raise the question of using inferior materials or of putting in a little less time on a job that it really requires.

OSBORN has been in business a long time. So have many of our customers. Working on the policy that it pays to insist on the same honest value when you sell as when you buy, we have both made friends and kept them. That, in the long run, is the way to play safe in building a successful and lasting business.

STEEL, IRON, STAINLESS, ALUMINUM, COPPER, ZINC AND PERFORATED SHEETS

TIN AND TERNE PLATE

TROUGH, GUTTER AND CONDUCTOR PIPE

AIR CONDITIONING AND WARM AIR FURNACES

REGISTERS

FURNACE PIPE AND FITTINGS

BLOWERS AND CONTROLS

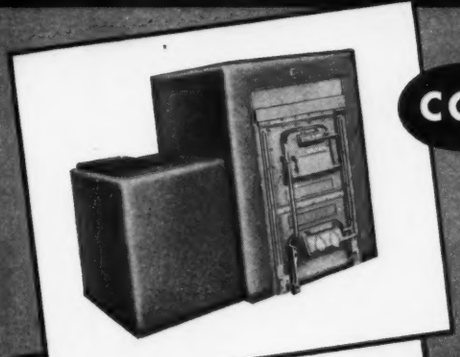
ASBESTOS AND ASPHALT ROOFING AND SIDING

TOOLS AND MACHINERY

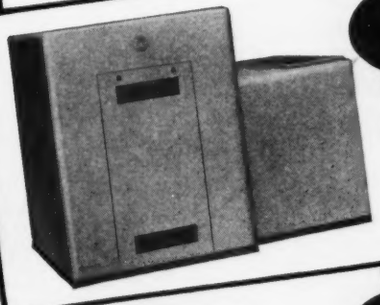
THE J. M. & L. A.
OSBORN Co
Manufacturers—Distributors
BUFFALO · CLEVELAND · DETROIT
Metals and Metal Products

A DEPENDABLE SOURCE OF SUPPLY FOR 80 YEARS

Why MORE SUNBEAM AIR CONDITIONERS HAVE BEEN *Installed* THAN ANY OTHER MAKE



COAL



OIL

GAS

AMERICAN HEATING EQUIPMENT COSTS NO MORE THAN OTHERS

First, Sunbeam Units deliver "Air Conditioning at its best" . . . and complete owner satisfaction is a vital essential in building a sound and profitable business. Sunbeam's dependable performance boosts sales.

Second, Sunbeam Units completely meet the needs of all homes new and old, large or small. The whole residential market is open to you. Sunbeam helps you get your share and more!

Third, Sunbeam Units are designed and built for all fuels — Oil, Coal or Gas. You are prepared to capture all three of these markets.

Fourth, *Sunbeam offers you prices that meet competitive bidding — prices that give you a greater profit margin.*

And here are "PLUS" advantages (1) Convenient Jobbers' Warehouse Stocks (2) A program of Consumer Advertising (3) Many Types of Dealer Helps (4) An Easy Time Payment Plan.

These factors have given SUNBEAM National Leadership and will give you Local Leadership. Write for the name of the Sunbeam Jobber nearest you. Use the coupon.

AMERICAN RADIATOR & Standard Sanitary CORPORATION
ELYRIA, OHIO

American Radiator & Standard Sanitary Corporation
Elyria, Ohio

Please send me complete details of "Profitable Leadership" with SUNBEAM.

Name_____

Address_____

City_____ State_____

AA-6-39

DO BETTER WORK WITH GRANITE CITY *Soft forming* GALVANIZED SHEETS

Easy working sheets will help you turn out finer looking sheet metal jobs. Bends will be truer, seams tighter, and joints neater. And these desirable results will be obtained with less work and a saving in time if you use Granite City Soft Forming Sheets, because they are uniform in ductility, gauge and size.

Other characteristics found in Granite City Soft Forming Galvanized Sheets which make for better finished jobs are an even, generous, tight coating of spelter; bright, uniform spangles; and unusual resistance to corrosion (especially, of course, in the copper bearing grades).

Ask your jobber to furnish Granite City Soft Forming Sheets on your next order.

SINCE
GRANITE CITY SHEETS
1878

GRANITE CITY STEEL CO.

GRANITE CITY, ILLINOIS

1803 Boatmen's Bank Building, St. Louis • 8 South Michigan Boulevard, Chicago • 1104 R. A. Long Building, Kansas City
1602 Mariner Tower, Milwaukee • 1613 Pioneer Building, St. Paul • 4000 York Street, Denver • 77 McCall Place, Memphis

A NEW 2-*Fisted* SALES WEAPON AT YOUR COMMAND

Home owners sit up and take notice when they hear about the advantages of **2-speed blowers.** They want and they buy this system which gives them extra home comfort at no extra cost.

Developed specially for the increasingly popular (and profitable) 2-speed system is the Leland 2-speed blower motor. It operates powerfully and quietly. And it has the same built-in dependability responsible for a unique Leland record . . . 99 6/10% of all Leland motors sold **never** require factory service.

The Leland 2-speed blower motor can be obtained in either split phase or condenser start types . . . ready for use on 3 or 5 wire controls. Optional equipment includes thermomatic protection against burnouts due to overloading. 110 or 220 volts. 60 cycles. 1725/1140 RPM.

Get a Leland for test. The Leland Electric Company, Dayton, Ohio.

LELAND MOTORS

TWO SPEED

Gold

IN THEM THAR KITCHENS!

The old prospector knew there was "gold in them thar hills." If he were alive today, and went *sheet metal prospecting*, he would see it as plainly in the kitchens of his town. Many homes are handicapped by worn-out, obsolete kitchen equipment.

Here is "pay dirt" in the form of stainless steel work—a gold mine of its kind. You can help homeowners save time and improve food-dishes by using Armco Stainless Steel for kitchen equipment.

Drainboards, work tops, splash boards, stove hoods, pot and pan racks and shelves will look better and last longer. Armco Stainless never imparts off-tastes to foodstuffs; nor is its gleaming beauty affected in any way by ordinary food acids. Because of its great strength and toughness it stoutly resists scratching and denting. Stainless is a real time-saver, too—easy to clean and keep clean.

Seek out home kitchen prospects and tell them about the advantages of Armco Stainless. Your neat work will please them and bring you a good margin of profit. For prices and fabricating information, call the Armco distributor or write us direct. The American Rolling Mill Company, General Offices 1301 Curtis Street, Middletown, Ohio.

ARMCO

ARMCO STAINLESS STEEL

HOW TO SAVE $10 to $15 ON FURNACE INSTALLATIONS!

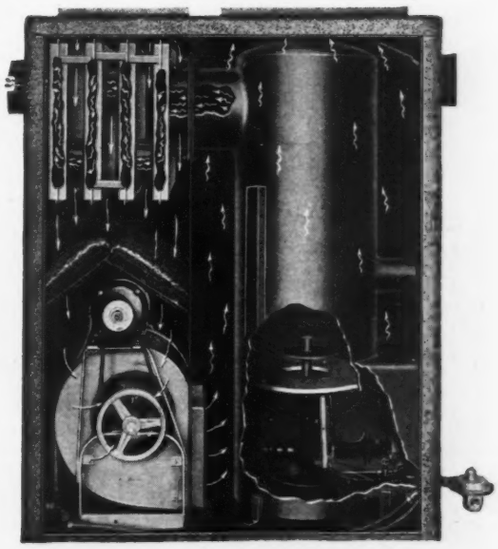
NEW GAS-FIRED PACKAGE-UNITS ADD PROFITS TO EVERY JOB YOU SELL

HERE at last are completely automatic winter-air conditioning gas-fired furnaces that actually save you $10 to $15 on every job you install. And dealers who have installed the G-63 and G-90 say that they'll not only save $10 or more on each installation, but will also be a profit builder to their line of furnaces. They also claim their attractive prices and efficient operation makes them an ideal unit to sell the lower priced home owners.

HERE'S HOW THEY SAVE MONEY

Because these Package-Units are not over 25″ wide, 54″ high and 50½″ long, they are assembled on a permanent steel base at the factory and are crated and shipped complete, with all controls wired, including the burner blower motor, and transformer. Thus, you not only save time and money on wiring but also on assembling and handling costs. You also save yourself the worry and expense of lost parts because with these package units you can easily move them into the basement of any home and uncrate them right on the spot to be installed.

COSTLY BURNER AND BLOWER ADJUSTMENTS ARE ELIMINATED TOO, WHEN YOU INSTALL A G-90 OR G-63 FOR THE MICHIGAN TANK AND FURNACE CORPORATION TESTS EACH ASSEMBLED UNIT BEFORE IT IS SHIPPED. Write us today for literature and prices.



STANDARD EQUIPMENT

BURNER—Including gas valve, pressure regulator, automatic pilot, pilot lighter, pilot shut-off cock, main gas shut-off valve.

TRANSFORMER

THERMOSTAT

COMBUSTION COMPARTMENT

RADIATOR

DRAFT DIVERTER

OUTER CASING — Furniture steel, insulated green crinkle finish.

COMBINATION LIMIT AND FAN SWITCH.

FIREPROOF FILTERS—Renewable.

BLOWER—Belt, variable speed pulley; motor, rubber mounted.

HUMIDIFIER—Automatic type, with valve, vapor pan, copper tubing and fittings.

AGA RATING BTU

No.	BTU Input Per Hour	BTU at Bonnet	Capacity Register	Approx. Ship. Wt.
G-90	132,000	106,000	90,000	532 lbs.
G-63	87,000	69,500	63,000	480 lbs.

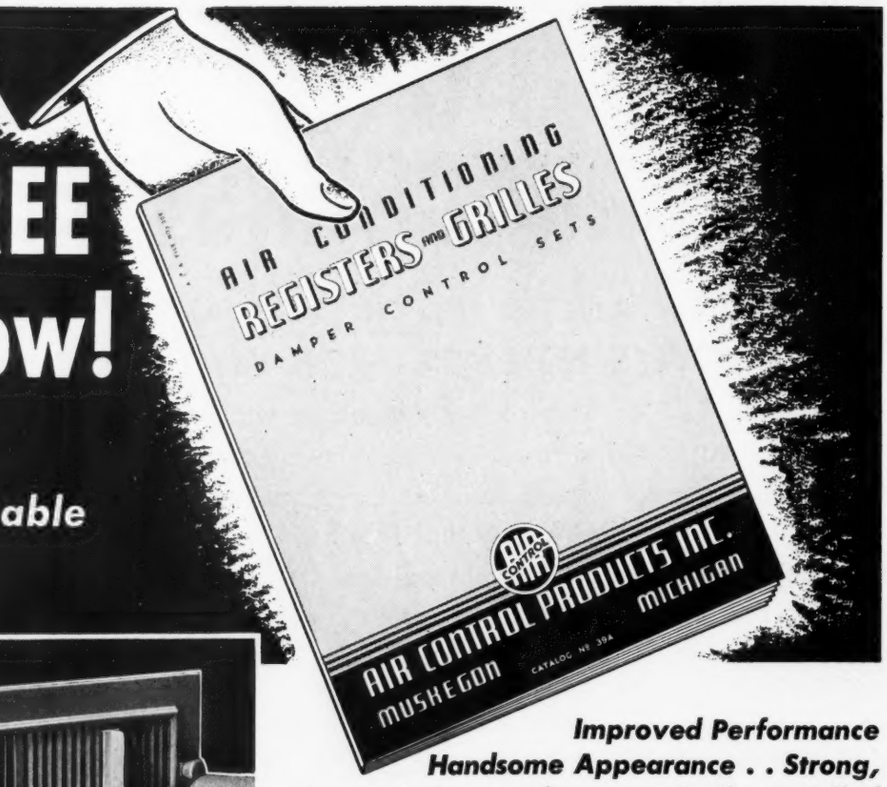
No.	Dimensions		
	Width	Height	Length
G-90	25″	54″	50½″
G-63	24″	53″	43½″

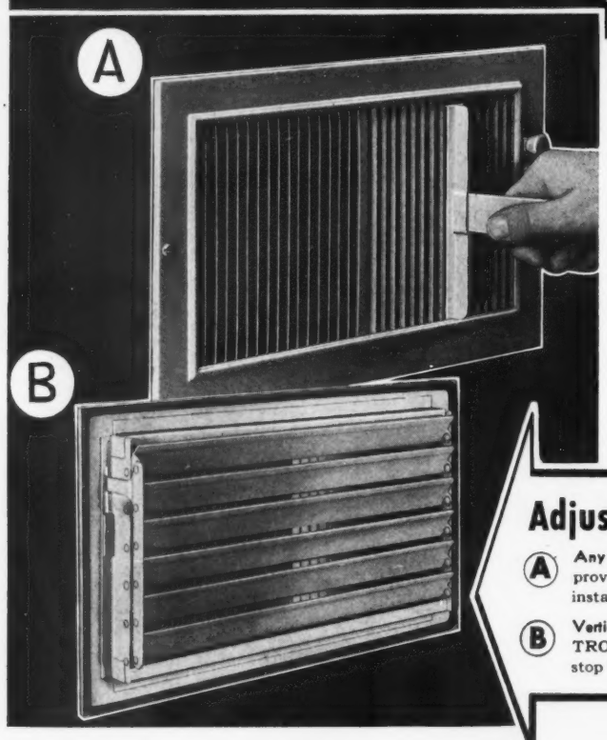
THE MICHIGAN TANK & FURNACE CORP.

14101 PRAIRIE AVE. • • • DETROIT, MICH.

Get Your FREE Copy Now!

Use Coupon For This Valuable Catalog!





Improved Performance Handsome Appearance . . Strong, Rugged Construction . . Easily Installed

No more air distribution headaches!—if you *standardize* on this new AIR CONTROL Register which regulates air flow in BOTH planes.

The register is so designed that ONE TYPE meets practically *all* heating, cooling or complete conditioning requirements—so priced that you can afford to use it on EVERY job . . . easily installed in wall or baseboard.

Here are registers that provide noiseless, uniform and draftless air distribution—*and they WON'T streak walls or ceilings.*

Get all the facts from our new Catalog—just off the press! Read about our scientific smoke tests—about our handsome styling and precision construction. Clip and mail coupon NOW!

Adjustable Both Vertically and Horizontally!

(A) **Any desired horizontal distribution of air obtained by adjusting vertical fins.** Special tool provided, which engages entire length of fin—adjustment easily made (even after installation) without danger of damage to register finish.

(B) **Vertical air deflection secured by movable horizontal louvers on back of register.** CONTROL KNOB permits louvers to be completely opened or tightly closed. Small stop below knob governs degree of deflection—from 15° upward to 30° downward.

Air Control

Registers and Grilles for Air Conditioning

AIR CONTROL PRODUCTS, INC. • MUSKEGON, MICHIGAN

Without obligation, please send me your new Catalog 39A, and also give me the name of the nearest jobber handling Air Control products.

NAME_____

ADDRESS_____ CITY_____

Send this Coupon

To Help You Do Better Work—And Make a Profit:

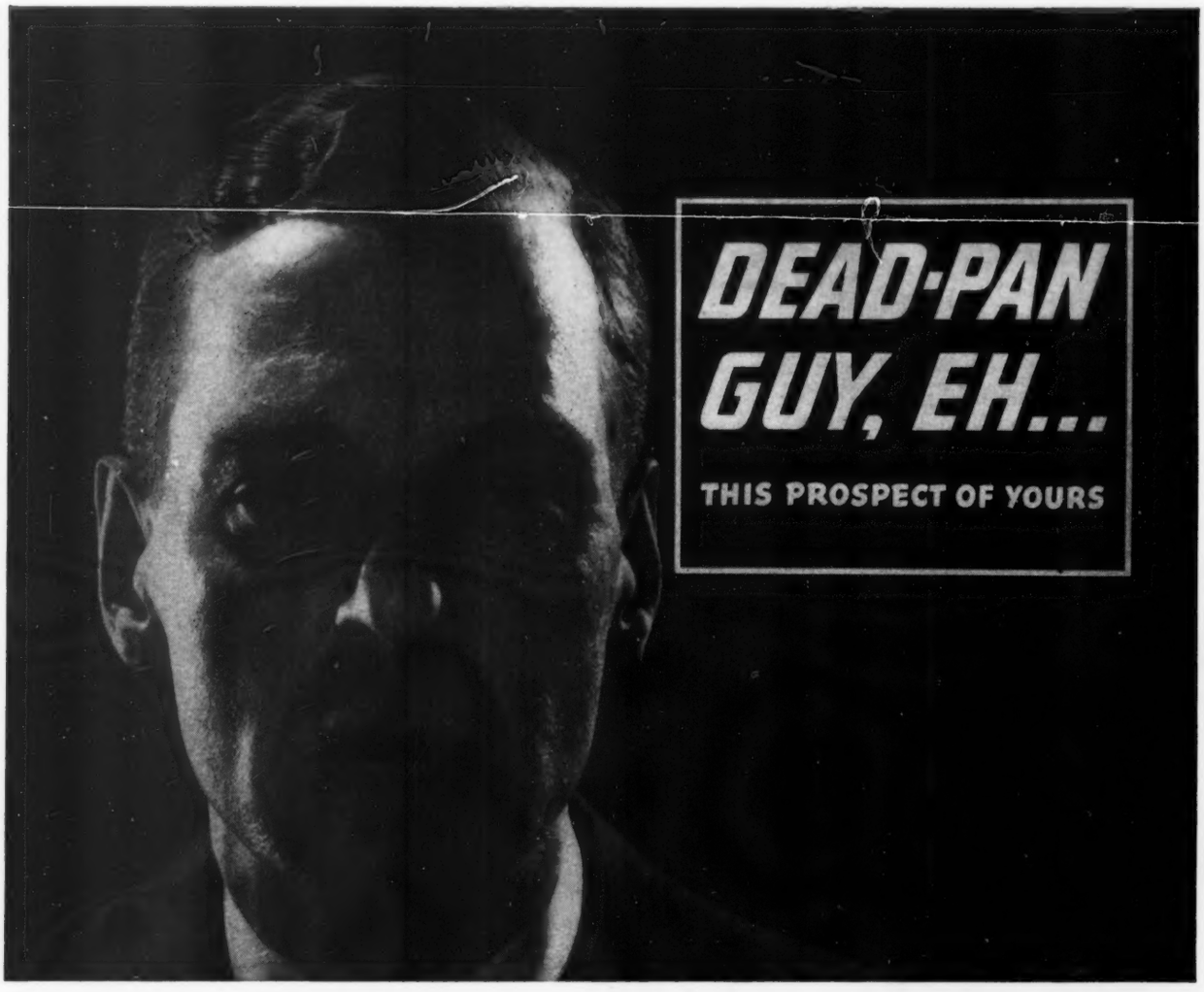
HANDY PIPE AND PRE-FABRICATED DUCT WORK!

Generations of furnace contractors have enjoyed and profited from Handy Pipe's superiorities.

And, today, it still leads—with our pre-fabricated duct-work providing *known-in-advance* costs to the most modern forced air and air-conditioning jobs.

Our Catalogue No. 52 "tells all."

F. MEYER & BRO. COMPANY



HOW your heart bleeds for your salesmen when they encounter this stony-faced type of buyer! Tougher to sell than "tough guys", these men with the lackluster eyes. They sit through your salesmen's most impassioned arguments with an emotionless calm that borders upon the sinister. A cruel, cruel mask of sales resistance . . . and very, very effective.

But when these dead-pan guys pick up American Artisan, they hang up those cold, grim masks. They are with an editor in whom they have confidence. And they are getting the authoritative business counsel for which they have paid in advance with voluntary subscriptions.

Your advertising in American Artisan can never take the place of your salesmen, but it *can* get your message to their hard-to-sell prospects in the residential air conditioning, warm-air heating and sheet metal contracting field while they are in a receptive frame of mind. It *can* make it easier for your salesmen to get a rise out of poker-faced buyers.

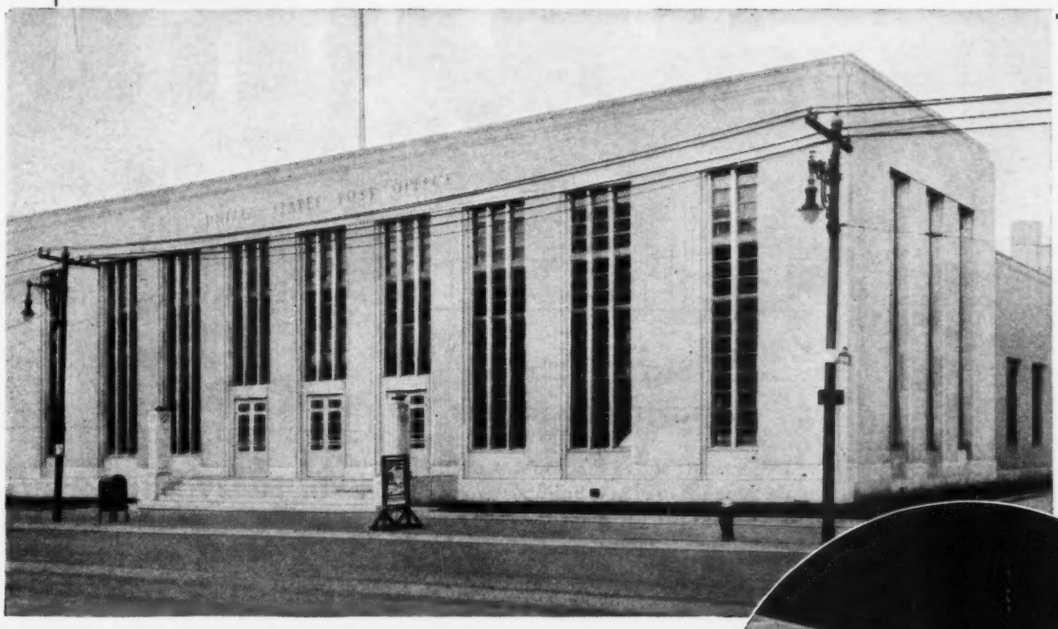
Highest editorial standards and publishing integrity.

AMERICAN ARTISAN

bears the two hall-marks of known value

Proved reader interest in terms of paid circulation.

To Control Drainage ...modern buildings use Anaconda Through-Wall Flashing



The new U. S. Post Office at West New York, N. J., designed by Paul Peter Cayot. Anaconda Through-Wall Flashing installed by C. F. Dieffenbach, Guttenburg, N. J., through general contractor Auf Der Heide-Aragona, Inc., of West New York.

It's moderately priced... easy to install... provides lasting efficiency

Masonry walls, being porous, have a tendency to accumulate water until the saturation point is reached...then seepage begins...and unless adequate drainage is provided, outside walls will be streaked and inside finishes damaged.

Anaconda Through-Wall Flashing provides the easiest, least expensive and most positive method of drainage control. So designed as to drain itself dry on a level bed, this flashing prevents lateral movement in any direction.

Made of 16-ounce Anaconda Copper, it is available in 5′ and 8′ lengths in a range of standard and special widths, and with various selvages. Publication C-28 describes Anaconda Through-Wall Flashing in detail. 3988

Visit the Copper & Brass Industry Exhibit in the Metals Building, New York World's Fair—1939.

© N. Y. W. F.

Corner Flashing Assembly—One-piece corner flashings are installed after straight flashings are in place. Lapping the straight flashings by two corrugations, the corner piece fits snug and secure. Note the bent down weatherlip which makes the completed assembly watertight.

ANACONDA
from mine to consumer

Anaconda Copper

THE AMERICAN BRASS COMPANY, General Offices: WATERBURY, CONNECTICUT

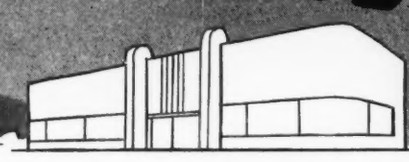
In Canada: Anaconda American Brass Ltd., New Toronto, Ontario · Subsidiary of Anaconda Copper Mining Company

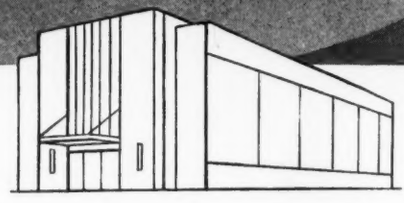
SEEK MORE BUSINESS-

and find it with

ENDURO

STAINLESS STEEL





In Every School

With many millions of dollars of Federal money being spent for the construction of new school buildings—this represents a ready-made active market for the sheet metal contractor looking for the better jobs. Republic advertising has been building acceptance for ENDURO* for years among architects and school management officials, just to make your selling easier when you suggest stainless steel for cafeteria and kitchen equipment, grilles, decorative trim, chair rails, kick plates, stair rails and treads, special lighting arrangements, ventilating and sanitary equipment and a host of other uses.

In Big and Small Department Stores

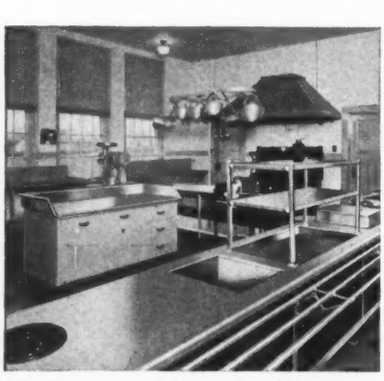
Department stores the country over, in the absence of a new building program, are modernizing to make their old buildings more attractive to the buying public. ENDURO is the ideal stainless steel for this purpose in its wide range of finishes. Dozens of uses have been developed — many affording an outlet for the sheet metal contractor's services — including store fronts, entrance and elevator doors and trim, kick plates, signs, card holders, display cases, window dressing items, cafeteria and kitchen equipment, hospital and rest room furnishings, and many others.

In Every Auditorium

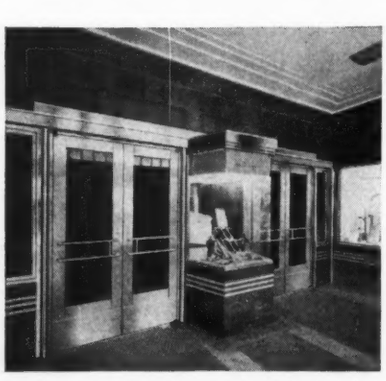
Perhaps you have noticed that wherever the public gathers, there's a real need for sturdy construction and sound materials. In auditoriums and halls of every kind, there's a need for the practically everlasting metal—ENDURO Stainless Steel. Use this argument, and also play up its low maintenance and low cleaning costs, when you suggest ENDURO to architects and building owners for decorative trim, cove lighting, grilles, chair rails, doors, window sills, stair rails, kick plates, hand rails, ticket booths, marquees and signs, toilet room partitions and any number of uses that suggest themselves.

REPUBLIC STEEL CORPORATION

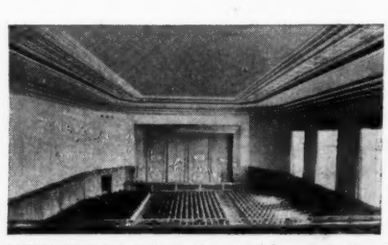
GENERAL OFFICES: CLEVELAND, OHIO • ALLOY STEEL DIVISION: MASSILLON, OHIO



ENDURO Stainless Steel was used throughout this school cafeteria—a nice job for the St. Louis fabricator.



In this store ENDURO was used for window trim, doors, and ornamental trim over entrance and in lobby.



ENDURO Stainless Steel adds a touch of brilliance to the ceiling relief of this modern auditorium.

*Reg. U. S. Pat. Off.

REG. U. S. PAT. OFF.

REPUBLIC STEEL

Republic makes a complete line of black, galvannealed and galvanized sheets of steel and rust-resisting Toncan Copper Molybdenum Iron. Also Taylor roofing ternes.

A very practical booklet telling how to fabricate stainless steel will be sent to you upon request.

BERGER MANUFACTURING DIVISION

NILES STEEL PRODUCTS DIVISION • STEEL AND TUBES, INC.

UNION DRAWN STEEL DIVISION • TRUSCON STEEL CO.

AMERICAN ARTISAN

Volume 108 Number 6

For Those Who Want Taxes Revised

THERE seems to be good reason to believe, if reports coming from Washington and newspaper comments are any criterion, that Congress really wants to do something about the present burden of taxes on industry. While, according to Washington reports, there may be difficulty in reducing the total of taxes imposed, there does seem to be a chance to shift the load so that some of the taxes which are particularly objectionable to our industry will be revised or reduced.

According to reports received members of Congress particularly want to hear from the folks back home, especially from the small business men and, if given sufficient encouragement, may effect revision.

To the end that business in general, and particularly small business, may be stimulated, certain treasury officials recently proposed changes in several tax laws. Almost simultaneously the Brookings Institute published a report and recommendations for tax revision. According to a summary of the suggestions made by the New York Herald-Tribune these proposed changes are as follows:

The Brookings Institution report, based on a study of taxation and investment, made specific recommendations for Federal tax changes, including the disregarding of capital gains and losses, abolition of tax on intercorporate dividends and substantial reduction in surtax rates in the upper brackets. It recommended that social security taxes be reduced and old-age annuities be financed on a pay-as-you-go basis rather than by the accumulation of a huge reserve.

The study, conducted by Dr. James D. Magee, of New York University, said the nation is now confronted with a situation where a clear-cut choice must be made between continuing the present tax system, "which arrests the flow of funds into new capital enterprises," or modifying the system in the interest of industrial expansion, greater employment, and higher standards of living:

The report made the following recommendations:

Corporation Income Tax

Small corporations should be allowed a credit of $3,000.

Operating losses should be deductible from income for a period of two years.

Capital gains and losses should be disregarded in calculating the tax. However, if the Congress insists on taxing capital gains as income, capital losses should be deductible.

The tax on intercorporate dividends should be abolished.

Greater flexibility should be permitted in the handling of depreciation charges, the percentage to be varied in relation to the volume of business.

Capital Stock and Excess Profits Tax

Both taxes should be eliminated. If it be deemed necessary to maintain the existing volume of revenue from corporation levies, the result should be gained by an increase in the rate on corporate income.

Social Security Taxes

The old-age annuities should be financed on a pay-as-you go basis rather than by the accumulation of a huge reserve.

The rates for the old-age annuities should be temporarily from 1 to ½ of 1 per cent, and be subsequently increased only as benefit payments necessitate.

The modest contingent reserves should be invested in outstanding government bonds at current rates; and the financial administration of the system should be segregated from the fiscal operations of the Treasury.

Undistributed Profits Tax

This tax should be abolished.

Personal Taxes and Tax-Exempt Securities

The surtax rates in the upper brackets should be substantially reduced.

The normal income tax on corporate dividends should be eliminated.

Capital gains and losses should be disregarded. However, if this is not done, deductions for capital losses should be allowed.

The Federal income tax should be made to apply to state employees and Federal employees should similarly be subjected to state income taxes.

Undoubtedly everyone in this industry is interested in taxes. To obtain results and to further the general cause of tax revision and tax reduction, those favoring changes should communicate with their Congressmen and Senators and, in addition, should write their views to the Senate Finance Committee and the House Ways and Means Committee, Washington, D. C.

National Warm Air Convention

THE 1939 Mid-Year meeting of the National Warm Air Heating and Air Conditioning Association held June 5, 6 and 7 in Chicago provided for manufacturers, jobbers and contractors attending a program of more than ordinary interest with particular emphasis upon problems of design, selling and installation.

This useful information covered a wide range of subjects including such up-to-the-minute subjects as—How Manufacturers Can Co-operate With Dealers in Selling Warm Air Heating Systems; Some Dangers of Over Selling Air Cleaning; How Filters and Blower Systems Can Be Employed to Relieve Hay Fever and Asthma; Recent Tests on Furnace Baffling; The Performance of Stokers Under Intermittent Firing in the Research Residence; Future Investigations at the Research Residence.

President Taylor, opening the meeting posed the question of how much each member actually did during the last six months to further the research program, advance the publicity program, and to widen the interest in the association and its work. President Taylor emphasized that the association does not need passive members. He said that warm air heating now enjoys popular favor and is recognized as a leader in heating methods which makes it highly necessary that this leadership be maintained through the contribution of money to the association, the support of all active members and every bit of assistance members can render to the publicity and research programs.

Ralph Blanchard, chairman of the membership committee, reported fourteen new active and two new co-operating members secured during the past six months.

Changing Heating Markets

K. C. Richmond, Editor, "Coal Heat," speaking on "Changing Heating Equipment Markets," declared that the present heating market is in a state of flux with populations in large cities decreasing, with the birth rate for the country as a whole dropping, with the demand for greater comfort increasing, and with the public showing a decided preference for some things which are not absolutely essential to home comfort. Mr. Richmond showed slides from the Real Property Inventory and from the Owens-Illinois survey of existing heating systems, indicating the consumption of coal, oil and gas by states and areas; the age, type of construction, method of heating used in existing homes by cities and states; and surveys of common complaints on heating systems and heating equipment. Mr. Richmond pointed out that while building in the residential field is increasing, incomes still show approximately 70 percent of the wage earners earning less than $2,000 a year, which means that the heating industry (as well as the construction industry as a whole) must now cater to a cheaper type of house construction.

Mr. Richmond indicated one phase of the present day home construction which should attract the attention of everyone in the field—the tendency of the speculative builder to skimp on heating, to oversell air conditioning and cooling, and to build houses which are "dolled up" with gadgets in the kitchen and bathroom, neglecting the important heating plant.

Overselling Air Cleaning

Jan. S. Irvine, Owens-Corning Fiberglas Corp., Toledo, Ohio, speaking on "Don't Oversell Clean Air Delivery" stated that he believed heating salesmen too frequently oversell clean heat and guarantee 100 percent cleaning, whereas practically no heating system as we design and install today can clean the air 100 percent efficiently. Mr. Irvine pointed out that the aspirating effect of air issuing from registers sets the air of the room in motion, drawing to the register air stream, air from the room which is dust laden and which has not passed through the filters, resulting in dirt streaks on walls and ceiling, this dirtying effect of asperated air being blamed upon the cleaning equipment. Mr. Irvine pointed out that in a system employing approximately 3,000 cfm, if only 5 percent of the air leaks by the filters, we will have 50 cu. ft. of air per minute or 9,000 cu. ft. of air per hour of uncleaned air issuing from the register.

Cooling by Air Movement

B. G. Krause, Air Controls, Inc., Cleveland, speaking on "Cooling With Air Movement" pointed out the fundamental principles of night air cooling and attic ventilation as employed in various parts of the country, emphasizing that in the Northern part of the country, night air cooling, whereby large volumes of cool night air are circulated through the house from late afternoon through the evening, reduce house structural and equipment temperatures and ventilate the rooms and in Southern states where night air temperatures ordinarily are quite high, actual ventilation of the house and the attic 24 hours a day is essential, have grown to be the two distinct types of night air cooling or attic ventilation systems now employed. Mr. Krause called attention to the fact that night air cooling is sometimes sold on the basis of reducing temperatures below temperatures which actually exist outdoors, thereby causing the home owner to expect conditions which can not be provided.

Mr. Krause discussed some of the engineering features of attic ventilation or night air cooling as published in numerous articles from the Research

Residence and other authors in American Artisan. Thirty air changes per hour for Northern parts of the country and from sixty to 120 air changes per hour for Southern areas were stated as being desirable design conditions. Mr. Krause also briefly touched upon some of the installation practices such as location of grilles and registers, boxing and housing of the fan, location of the fan in the attic and the methods to eliminate vibration and noise," indicated that $150 was an average installed price.

Pollen Removal

Professor William H. Welker, of the University of Illinois College of Medicine, Chicago, speaking on "Air Filtration in Connection with House Dust, Hay Fever and Pollen Asthma Allergy," provided one of the most interesting papers of the convention. Despite the fact that Prof. Welker was dealing with a subject which is still controversial and which is highly technical in its basic characteristics, he made the subject understandable to his audience and established some facts which probably are not very well appreciated by this industry.

Professor Welker pointed out that at the present time there are two schools of thought on how dust in air causes detrimental physical effects—one school believes that materials in air are injurious because of the mechanical abrasive effect of the materials in the respiratory tract. The other school believes that silicas in solution enter the blood stream and it is the solution rather than the silica itself which causes harmful effects. Also carbon coal tar products and derivatives are injurious and are now believed to cause such things as cancer or cell multiplying growths. As a result of several years of tests at the University of Illinois College of Medicine, Dr. Welker declared that we now understand many persons are allergic to various types of pollens and dust and that these persons may be highly sensitive or of a low grade sensitivity and according to the degree of sensitivity, will react to the amounts and types of materials in the air. Persons of low grade sensitivity may have annoying, but not really dangerous, symtoms; whereas highly sensitized individuals may actually reach the place where hospitalization is essential.

The commonplace hay fever is due to the proteins of the pollen present in such weeds as ragweed and the College of Medicine has established that if such individuals are placed in a room which is 100 percent clear of pollen, all such symptoms as running nose, or sneezing or watery eyes disappear in from 3 minutes to 1½ hours duration, depending upon the sensitivity of the individual. At the same time such persons again show all of the characteristics of hay fever in from a very few minutes to a portion of an hour after entering pollen laden air.

Of particular interest, Dr. Welker indicated that the tests show that practically no air filter commonly used today in heating systems is suitable for pollen removal of the degree of cleaning required for pollen removal. Persons having low grade sensitivity may be relieved by the application of common types of filters in commonly used filter installations, but a really high grade sensitivity must be subject to 100 percent pollen free air. In the University of Illinois testing laboratory, as many as eight filters in parallel were used to obtain this cleaning effect and the air passing through the filter was held at 30 feet per minute velocity per square foot of filter area. Dr. Welker declared that to install a "quantative" pollen removal system, many filter units of sufficient area to bring about low air velocity, and absolutely no mechanical vibration in the filter must be installed. This would seem to eliminate the common types of blower-filter units which the warm air heating industry has advocated as a pollen-removal system. The only individuals who might be helped with such a system, according to Dr. Welker, are those with a very low-grade sensitivity. Dr. Welker also pointed out that physicians now understand that a person may be allergic to house dust such as the dust found in vacuum cleaners, or the lint from rugs and clothing, and where such cases are encountered, the installer should be very careful of what guarantees he makes unless he understands the case fully from the attending phyisician.

Standardization Committee

Perl S. Miller, Lamneck Products, Inc., Columbus, Ohio, speaking on "The Elimination of Waste in Our Industry Through Standardization" reported that the committee appointed at the December meeting has begun investigations of types and sizes, finishes, etc., according to the Department of Commerce Standardization and Elimination of Waste Recommendations. Mr. Miller introduced D. S. Hunter of Cleveland who explained briefly the steps our industry should take to secure the cooperation of the Department of Commerce in setting up standardization practices and specifications.

Two-Speed Blower Operation

H. F. Curtis, Henry Furnace & Foundry Company, Cleveland, speaking on "Two Speed Blower Operation" declared that two-speed blower operation has become important because: 1—it may have a very important effect upon selling programs, and 2— it seems to have inherent advantageous engineering characteristics. From an engineering standpoint, Mr. Curtis, declared that two-speed blower operation is distinctly advantageous in that it tends to eliminate stratification and maintains more even temperatures between ceiling and floor, despite the fact that the heating equipment may be intermittent in operation. As ordinarily installed, the blower operates from bonnet temperature, operating at low speed while bonnet temperatures are low and heating demands small and going to high speed when bonnet temperatures rise after the firing device goes on and continuing in high speed until bonnet temperatures are again reduced below the high speed temperature setting. One of the problems of intermittent furnace and blower op-

eration has been what to do with residual heat in the furnace after the house thermostat is satisfied, the bonnet temperature drops and the fan stops but there still remains heat in the furnace which finds its way by gravity flow to nearby rooms or second floor rooms, thus disturbing the balance of heat supply and air delivery, and in aggravated cases (where air can not get through the blower) the reversing of some warm air registers to become cold air returns and a gravity circulation thus set up within the piping system. Mr. Curtis pointed out that this condition is more characteristic of solid fuel systems rather than oil or gas where the furnace becomes cold after the burning device shuts off.

In the type of system where the furnace is located in a remote portion of the basement with long runs of basement duct and stacks to rooms at the other end of the building, air in such long runs loses temperature during off cycles of the blower, and where blower cycles are short, these remote rooms which do not have thermostatic control may never actually come up to temperature until the room where the thermostat is located shows a considerable drop in temperature and calls for a long operating cycle of the firing device and the blower. Two-speed blower operation tends to maintain a circulation of air through these long runs and keeps remote rooms more nearly uniform in temperature. As to cost, Mr. Curtis said that despite the fact that two-speed is practically continuous fan operation the University of Illinois tests indicate that two-speed operation is only slightly more costly for electric current than single speed, full-volume operation.

As to suggested control systems, Mr. Curtis said that the bonnet control might be set at 125 deg. "on" for low speed and 165 deg. "on" for high speed and back to low speed at 150 deg. and completely "off" at 110 deg. The actual blower setting may differ from job to job and should be determined by an actual test of the installation. In this connection, Mr. Curtis suggests that the system should be balanced on the high speed of the blower, leaving to the low speed the maintenance of air delivery balance and uniform circulation through the ducts.

Helping the Dealer to Sell

William Cook, Green Foundry & Furnace Works, Des Moines, Iowa, speaking on "How Best to Help The Dealer Sell" said that the best way to help the dealer sell was to actually *help* the dealer sell, and that he could not give any blanket suggestions for better merchandising campaigns, and could only point out what his company has done in an area composed largely of small towns and rural sections with no "large" city; an area covering a radius of roughly 350 miles, with a great many small dealers and only a few large dealers, and an area of home owners not particularly anxious to buy the latest gadget just because it is the latest gadget, from which conditions the following suggestions have been developed:

1—Engineering help is essential and this engineering help should be of the type whereby the furnace manufacturer's salesman may actually lay out the plan and indicate the complete system for the dealer, or the engineering department in the home office may do the same.

2—All kinds of sales help, primarily the assistance of the furnace manufacturers' salesman in calling on the home owner with the dealer to start or close the sale. The Green company has 22 salesmen in its area and each one of these men is trained in the Green sales presentation and engineering manual and a Green salesman may actually make a canvas to find a prospect, may draw a plan and engineer the job, may go with the dealer to close the sale and finally may actually balance the system after it is installed. During the past year the Green company has held 17 dealer meetings of 1-day duration and 90 percent of the time of the meeting has been devoted to merchandising, rather than engineering.

3—A 64-page dealer sales manual in which sales methods are presented in plain language has been used with satisfactory, but not particularly startling, results.

4—The manufacturer furnishes the dealer with display material, leaflets, a direct mail campaign, and all the necessary literature to explain what a warm air heating system is and what the manufacturer's product looks like. All of this sales help is furnished free of charge to the dealer, but the Green company has not yet been able to develop a newspaper advertising co-operating campaign in which the dealer and the manufacturer both participate.

Baffling Furnaces

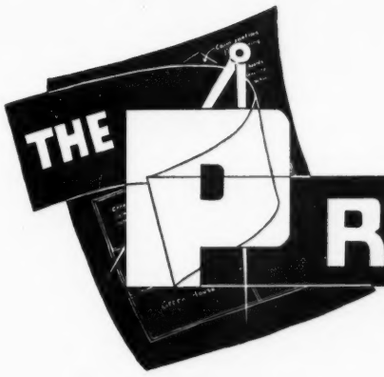
Professor L. G. Miller, Michigan State College, East Lansing, Michigan, presented a paper on rating and baffling forced warm air heating furnaces, based upon investigations at the Michigan State laboratory. This information will probably be published in a later issue in the form of a more complete report of the tests conducted. The conclusions from the tests, as reported by Prof. Miller, might be summarized as follows:

1—In order that a manufacturer may guarantee that any part of the heating surface will not attain damaging temperatures, it would seem that a minimum air velocity depending upon the fuel used, the ratio of primary heating surface to grate area, and the material of construction should be specified. Whether a maximum velocity should be named seems to be doubtful.

2—There seems to be no connection, at least in domestic size furnaces, between heat release and volume of combustion space, except that enough space must be provided for the proper burning of the fuel used.

3—Since the conductivity of metal is so great, compared with gas film, there is no measurable difference in temperature between inside and outside

(*Continued on page* 88)



PROBLEM CORNER

April Smoky Furnace Problem

American Artisan:

Referring to the "smoking furnace" on Page 53 of April, 1939, issue, I suggest cleaning the ash pit thoroughly and disconnecting one of the warm air pipes. Then make a fire in the ash pit using a coal tar roofing paper or a similar odor and smoke producing substance. Of course, care should be taken to not cut draft enough to allow smoke to come out of cleanout, feed or ash door. If you get smoke then remove enough of the casing to locate the leak. It may be in the ash pit.

If no smoke is obtained while the furnace is smudged you can feel certain that the smoke comes from an outside source. It sometimes happens that something on the "floor" or base inside the casing smokes when the fire has been on long enough to cause the radiant heat from the heater to bring the offending material up to a temperature sufficient to cause flameless, but smoke producing, combustion. A piece of very soft coal or even a piece of tar paper could cause trouble.

The odor of wood is so destructive that it is easily located. An overflow of oil, when burning oil, sometimes soaks into the furnace base. When the castings are highly heated the oil odor will be in evidence but before the poor furnace man gets there the furnace is cooler and the radiation from heater is not enough to send up an odor. It should be borne in mind that the shoe or boot or perhaps an underground duct may be a hiding place for some offender. C. W. S. does not indicate whether any part of the air supply is from the outside which might at times bring in smoke.

However, the 1½ hour period after starting fire makes it look like a radiant heat job.

There is a bare possibility that a cracked place or other opening in the castings opens up when hot and closes up when fire dies down. If that is suspected, heat up with a thin fast burning fire. Then rake fire to one side so smoke from tar paper in ash pit can get through and smudge while hot.

After hunting in all probable places then look into all the outrageously improbable ones.

L. W. Millis,
Security Stove & Manufacturing Co.,
Kansas City, Mo.

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American Artisan:

Relative to the smoking-furnace problem submitted by C. W. S., evidently the smoke somehow finds its way out through small cracks or crevices, possibly where the smoke pipe joins the furnace or through other joints. The place might be found by examining the inside of the casing for stains.

But still the smoke should go out through the flue, instead of into the warm air current, unless the air pressure on the furnace walls is greater inside than outside, causing exfiltration.

This condition is caused by one or more of the following factors.

1. Obstruction or openings in flue.
2. Cold air pipes too small, too long, or lacking pitch.
3. Furnace room or cellar air-tight or nearly so. This would bring about the exact condition described, including periodic smoking. The total area of openings in cellar walls should equal the area of the smoke pipe. If the cellar is entirely air-tight, no smoke at all will go up the flue.

WM. SCOTT, Penna.

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Motor Torque

American Artisan:

Some time ago you published a series of articles on small motors for residential air conditioning by C. H. Lankford of the Century Electric Co. (Jan., Feb., March, April, 1938). Could you please have Mr. Lankford explain torque more clearly.

M. M., Penna.

Reply by
C. H. Lankford

The torque of a motor, irrespective of whether it be large or small, is the turning effort or the ability of the motor to start a load or pull a load under any given set of conditions. Possibly a concrete example would help to a better understanding of the problem.

If we take a 1 HP, 1750 RPM motor and put a 6-inch diameter pulley on it and measure the effort which the motor is putting out when pulling a load of exactly 1 HP, it will be found that the pull or the strain exerted on the belt on this pulley is approximately 12 pounds. If we put a 12-inch pulley on this same motor, the pull at the face of the pulley will be (when operating under the same conditions) 6 pounds. And if it were practical to put a 24-inch pulley on the shaft of the motor, the pull which the motor would have to exert to deliver 1 HP would be only 3 pounds.

By multiplying the radius of the pulley—that is, the distance from the center line of the shaft to the face of the pulley—by the pull exerted, we will get a result of 3 pounds-feet, which is approximately the equivalent of 1 HP at 1750 RPM. This is the running torque of the motor, or the full load running torque.

The other torque in which we might be interested is the starting torque, or the starting effort which the motor exerts when it is first thrown on the line. This is the torque which is most easily measured because it is measured when the motor is standing still, or approximately so.

If we now take the same 1 HP motor and actually measure with a spring balance the torque exerted at the face of, say, the 24-inch pulley, which has a 1-foot radius, the result in pounds as measured by the scale would represent the static torque, or starting torque, of the motor.

Now suppose we might say that the motor has 300 per cent starting torque. It would be found that the pull exerted on the scale on the 24-inch diameter pulley would be 9 pounds, which is three times the full load at 3 pounds, or 300 per cent.

As I have pointed out in the article to which you referred different motors have different starting torques, or starting efforts, but the running torque is always approximately the same for all motors of the same horsepower and same speed. In other words they are doing the same work.

A New Drive by FHA To Promote Modernization

A NATION-WIDE campaign to promote property modernization and repair is planned to "break" simultaneously in all sections of the country early in June. The theme is "Fix Up Your Home! Modernize Outside and Inside," and convenient monthly payments on the FHA Plan of installment buying will be featured.

During the past few years our industry has found that many modernization jobs can be closed and new prospects developed by featuring these Property Improvement Loans (FHA Title I Loans). Furthermore, the FHA Plan means cash payment to the dealer.

Members of the industry should take a special interest in figures recently released by the Federal Housing Administration. These show that even during the normally dull winter period, private lending institutions continued to make Property Improvement Loans, and that more inquiries and applications for these loans are being received **right now** than at any time since the FHA Plan was put in operation. Modernization loans insured by FHA during the last week of April amounted to $4,500,000, or more than 9,000 loans per week.

The mounting figures suggest that all branches of the building industry should plan concentrated action for the coming months. In line with these suggestions, FHA is preparing literature and display material for the trade. This will be available at headquarters in Washington, or through FHA's 64 field offices, about the first of June.

The material includes a colorful window display printed in red, blue, buff and black and a cleverly illustrated booklet with a check list for home owners, printed in red and black. A mineographed piece will describe how dealers can develop and handle business under the "Property Improvement Credit Plan," Title I of the National Housing Act. It is a brief merchandising manual for dealers suggesting means by which they may increase their sales through the FHA plan of installment payments. This Dealer Guide is for distribution by manufacturers and trade associations to their sales outlets.

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Above—Emblem, 36 inches square, printed in red, blue, buff which identifies cooperating retailer. At right—Window poster printed in red and two shades of blue, available in three sizes (See windows for typical uses).

Material Available to Contractors

Both the display material and literature are available to all dealers wishing to be identified with the national modernization program, but it will be sent only on **direct request.** To avoid duplication, manufacturers and trade associations should have the dealers themselves send in their orders. It is suggested that this be done as soon as possible since

THE FHA PLAN 3 SIMPLE STEPS
Plan Your Improvements
Get an Estimate.....
Apply for a Loan.....
HOW TO MODERNIZE
OUTSIDE and INSIDE
FEDERAL HOUSING ADMINISTRATION
STEWART McDONALD, Administrator
Here's where to CHECK YOUR HOME FOR IMPROVEMENTS
YOUR HOME MAY BE PUT IN GOOD REPAIR, REMODELED, REDECORATED ON THE FHA PLAN

quantities are limited and it is a case of "first come, first served," in filling requests.

Window Display Material

The window display pieces are designed to be used separately and may be adapted to the needs and display facilities of individual dealers. However, this material is essentially a unified window display in which all pieces are employed to feature the dealer's merchandise. A colorful streamer bearing the legend, "Fix Up Your Home," extends across the window, and side streamers suggest improvements "Your Home Can Have." There are also "before and after" cards, posters and seals. In order to instruct dealers on how to arrange this material attractively in their windows, a descriptive folder has been prepared. This folder reproduces the window displays in full color. Copies are available for manufacturers, trade associations, and others who wish to tie in their sales outlets with the national modernization program.

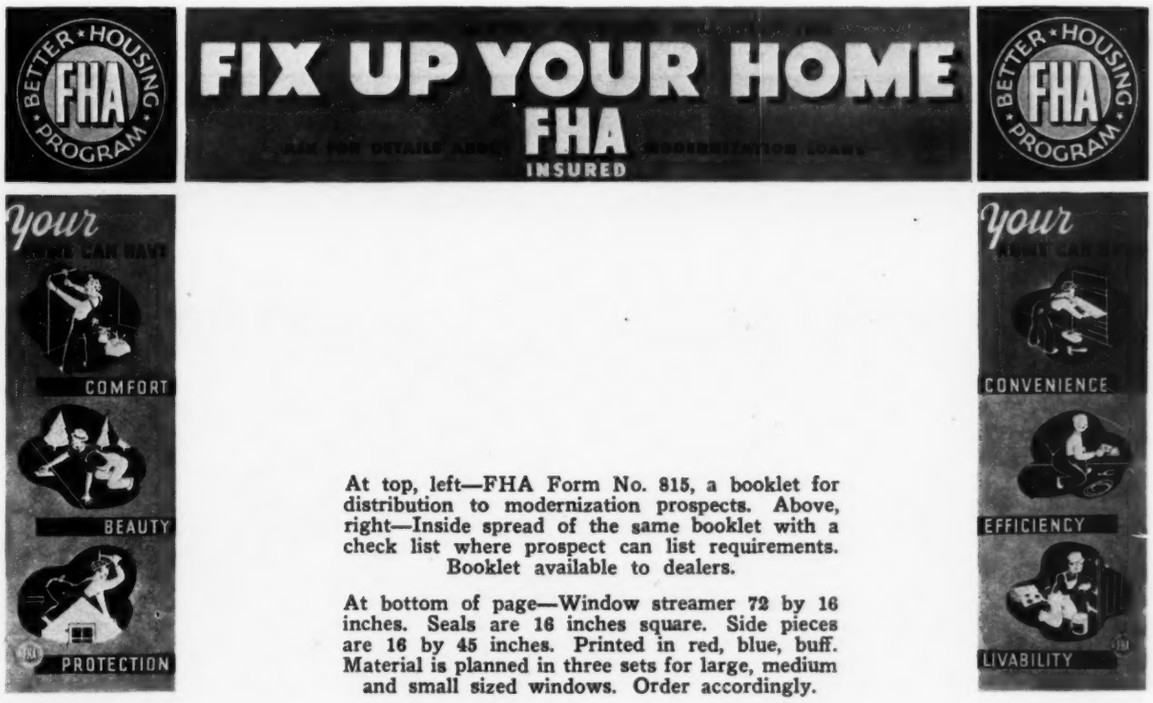
Specimen newspaper advertisements are also prepared by the Federal Housing Administration for dealer use. These are mailed in proof form to local newspapers who will be supplied with mats of the art work on request.

Radio, Movies, Newspapers, Booklets

Other mediums besides store display, direct mail, and newspapers will be used during the forthcoming campaign. A car card will be released for national distribution in trains, cars and buses.

Special radio programs are being arranged locally by all State and District Offices of FHA. In addition, manufacturers, dealers, and others will be provided, upon request, with scripts and commercial announcements by which their products may be tied in to the national program for Home and Business Property Modernization.

A Technicolor movie, "Miracles of Modernization," is also being released to motion picture houses all over the country. This film shows the actual transformations that modernization can make in a series of colorful "befores and afters." It is estimated that nearly 100,000,000 people will view



At top, left—FHA Form No. 815, a booklet for distribution to modernization prospects. Above, right—Inside spread of the same booklet with a check list where prospect can list requirements. Booklet available to dealers.

At bottom of page—Window streamer 72 by 16 inches. Seals are 16 inches square. Side pieces are 16 by 45 inches. Printed in red, blue, buff. Material is planned in three sets for large, medium and small sized windows. Order accordingly.

For Dealers who sell "Home Modernization"

DISPLAY MATERIAL ADAPTABLE TO ANY SIZE WINDOW . . .

Above—Layout of four-page folder printed in four colors (FHA Form No. 833) Booklet describes three sets of display material: No. 7 for windows 12 to 16 feet; No. 8 for windows 8 to 12 feet; No. 9 for windows 4 to 8 feet. Available to dealers. Below—Street car card printed in red, black and blue for national display. Not available to dealers.

this film within the next few months. Local theatre exhibitors should be consulted for information about dates of showings.

Of course, the lending institutions themselves will play an important part in the national modernization program. The Federal Housing Administration is supplying them with special posters reading, "We Make Loans to Modernize" which will be on display in their windows and on counters.

There are some 10,000 of these lending agencies who now hold contracts of insurance with the Federal Housing Administration to make Property Improvement Loans.

Any of these institutions will be glad to cooperate with dealers who refer them modernization prospects. They will also be able to supply FHA literature and printed forms as well as information about the FHA Plan. Lists of the qualified financial institutions in any locality may be obtained through the FHA field offices, or by writing direct to the Federal Housing Administration at Washington.

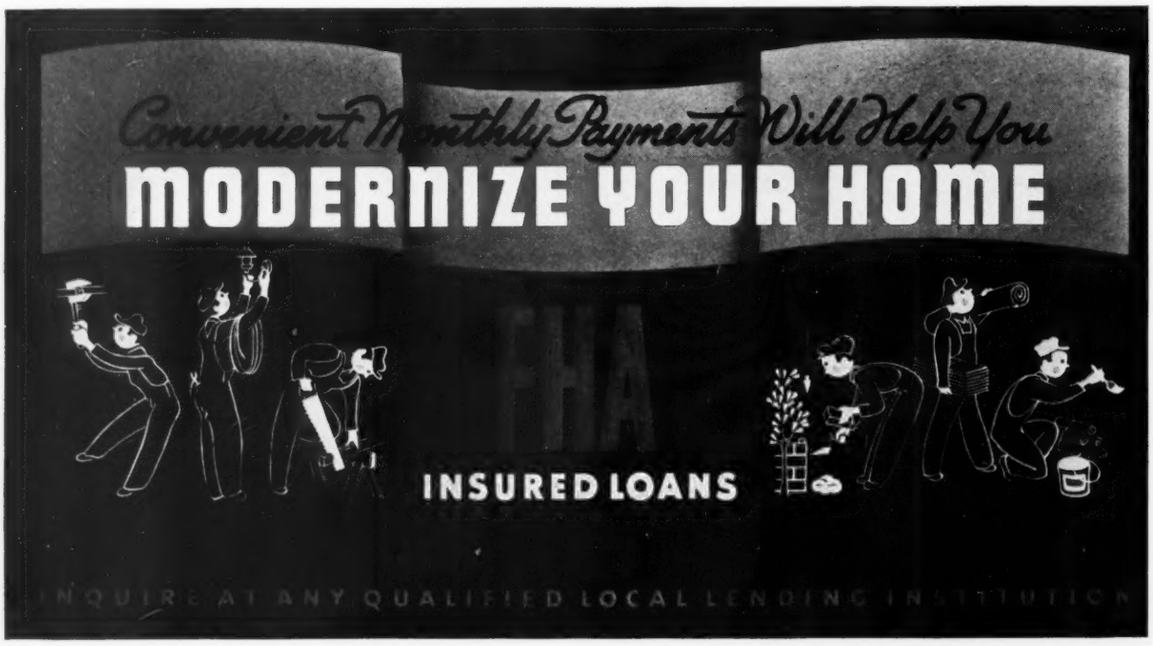

Convenient Monthly Payments Will Help You
MODERNIZE YOUR HOME
INSURED LOANS
INQUIRE AT ANY QUALIFIED LOCAL LENDING INSTITUTION

TABLE 1—COMPARISON OF STATEMENT

Total Business—Shop No. 1				$23,251.82
Total Business—Shop No. 2				21,202.39
Difference				$2,049.43
No. 1—Profit added to total				$ 3,711.61
No. 2—Profit added to total				3,022.67
MATERIAL			**Gain**	**Loss**
No. 1—Charged to bills	$10,189.43	Purchased $9,709.68	$ 479.75	
No. 2—Charged to bills	8,025.05	Purchased 9,015.67		$ 990.62
PRODUCTIVE LABOR (Paid to Men on Jobs)				
No. 1—Charged to bills	$ 5,409.51	Purchased $5,222.49	$ 187.02	
No. 2—Charged to bills	5,222.95	Purchased 5,901.20		678.05
OVERHEAD EXPENSE				
No. 1—Charged to bills	$ 4,085.49	Purchased $5,047.26		$ 961.77
No. 2—Charged to bills	5,179.55	Purchased 6,999.13		1,819.58
No. 1—Discount profit on prepaid bills			$ 146.67	
NUMBER OF JOBS; PROFIT AND LOSS PER JOB				
No. 1—914; Profit, $3,272.39; Profit per job, $3.58				
No. 2—795; Loss, 713.41; LOSS per job, .91				
NET* PROFIT AND LOSS FROM ORIGINAL PROFIT *ASKED				
No. 1—914 jobs; Profit ASKED, $3,711.61—Each job, $4.06				
No. 2—790 jobs; Profit ASKED, 3,022.07—Each job, 4.23				
ESTIMATED NUMBER OF JOBS WITH LITTLE OR NO COMPETITION				
No. 1—41 per cent of Total	$23,251.82	$9,533.25		
No. 2—29 per cent of Total	21,202.39	6,148.69		
OVERHEAD EXPENSE AVERAGE EACH JOB SHOULD HAVE BORNE				
No. 1—$5,047.26—914 jobs—$5.52; Actually added—$4.47; Missed, $1.05 per job				
No. 2— 6,999.13—790 jobs— 9.73; Actually added— 6.56; Missed, 3.19 per job				

How Two Comparable Philadelphia Shops Made or Lost Money

By Benjamin F. John

TWO Philadelphia shop owners doing a "jobbing" business in roofing, sheet metal and warm air heating, at the beginning of 1930, after listening to and entering into a discussion on overhead expense at a meeting, made a wager as to which one made the most profit during 1929. Subsequently, to settle the matter, an accountant was engaged, with the proviso that no names or figures be made known to anyone else until permission was granted. By "jobbing shop" is meant one that repairs, alters and renews roofing, sheet metal and warm air heating systems in existing buildings and dwellings with a possible "flyer" into the new work on new dwellings two or three times a year.

The owners' shops were located on a main street, at either end of the city and they seldom met in competition. Both owned their building. Shop No. 1 occupied the whole building as show room, office and shop, with an assessed value of about $9,000; also he owned a dwelling elsewhere, paid for from the profit of the business and some other personal investments.

Shop No. 2 owner occupied the first floor of his building, rented out the second and third floor, and lived elsewhere. His building was assessed at about $7,500 and had a mortgage on it of approximately $2,000 which was being paid off through a building and loan association. Both had been in business a number of years in the same location and had a mailing list of regular customers numbering from five to seven hundred. The volume of business regularly received from these customers amounted to an average of 35 and 30 per cent respectively of the year's average volume over a period of three years. Both men were excellent mechanics and had served their apprenticeship.

A quick survey of the previous years proved that both made money some years and lost money in others, *according to their own figures.* Neither man worked with the tools and each drew a salary of between $35.00 to $55.00 a week in various years depending upon the amount of business. Profit, when made in any year, was credited to the "boss" account and, due to the single entry in some years showing a profit when there was a loss, shop No. 2 paid an income tax in several of the years when really there was a loss.

Table 1, above, shows what the two shops actually did.

National Contractor Conference

At the Columbus Conference of the National Secretaries' Conference representing air conditioning, ventilation and heating, sheet metal and roofing work and allied industries, held on May 20 Paul L. Biersach, Secretary, reports on organization of a National Contractor Conference with the necessary Document formulated by a committee composed of C. M. Gundlach of Sandusky, Ohio, H. C. Bitter of Toledo, and Clarence J. Meyer of Buffalo, to be presented for consideration and discussion at the Milwaukee meeting.

It was decided to place a copy of these organization papers in the hands of all those interested in the formulating of a National organization.

Several names have been suggested, but no definite decision has been made.

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A PROSPECTUS
CODE OF REGULATION AND BY-LAWS

Article I
Name

This organization shall be known as THE NATIONAL SHEET METAL, ROOFING, AND ALLIED INDUSTRIES' SECRETARIES' CONFERENCE OF THE UNITED STATES OF AMERICA INCORPORATED. (A non-profit Corporation.)

Article II
Object

The purpose for which this Conference is formed, shall be to represent the Sheet Metal, Roofing, Gravity and Mechanical Warm Air Heating, Air Conditioning, Ventilating, and Allied Industries: To promote and foster the business of its member-associations; to reform abuses; to strive to promote friendly relations among and between those in our Industry; to strive for amicable and equitable relations between its member-associations and manufacturers, jobbers, and dealers in material and equipment; to effect uniformity in trade practices; to protect as far as possible, the Sheet Metal, Roofing, Warm Air Heating and Air Conditioning contractors of the United States from the purchasing of merchandise, equipment and materials of an inferior quality; to approve only materials, equipment and merchandise that will give maximum service for the money invested; to endeavor by education, to create fair competition in the industry; to defend the Industry against encroachments upon its common rights; to settle jurisdictional disputes among trade unions; to maintain friendly relations between employers and their employees; to assist member-associations in negotiating satisfactory labor agreements with their employees; to assist local associations in the establishment and adoption of correct and satisfactory trade practice Codes and Ordinances; to assist local and regional member-associations in the establishment of Sheet Metal Working and Roofing Apprenticeship classes, and/or schools; and to do any and all acts and things necessary, convenient or expedient to accomplish all these things, and whatsoever other projects time and customs might bring forth.

Article III
Membership

All State, District and/or Local Associations or individual contractors representing any, either or all of the industries this Conference is formed to represent, shall become eligible for membership in this Conference, by presenting an application properly executed. Such an application shall state the name, names of officers, location, and a brief summary of the object of the association making application for membership. Application for membership shall be made to the Executive Secretary of this Conference. All applications shall be accompanied by the membership fee, and shall be approved or rejected by the Board of Trustees.

In the event said application is approved, the Executive Secretary shall immediately notify the applicant of his or their election to membership. In the event said application is rejected, the Executive Secretary shall immediately notify the applicant and refund the membership fee heretofore deposited. The elected member shall, on or before thirty days after election, sign the membership roll and the Code of Regulations and By-Laws, and agree, on such form as may be prescribed by the Board of Trustees, to be governed by, and abide by, the Code of Regulations and By-Laws, and to obey all lawful orders of the Conference, its officers and Board of Trustees. A rejected applicant, or an expelled member, may re-apply for membership in this Association; and the Application shall be treated as an original application for membership.

Article IV
Resignation and Expulsion of Members

Any member in good standing may resign from this Conference in the manner herein provided. His resignation shall be in writing and shall be addressed to the Executive Secretary of this Conference, and if such member is not in default, it shall be accepted by the Conference at the next regular meeting. The Executive Secretary shall communicate to the resigning member the acceptance or rejection by this Conference of such resignation. If resignation is rejected, he shall state the reasons therefor; and if same is accepted he shall strike the member's name from the membership roll. Upon the acceptance of such resignation, the resigning member shall immediately cease to have any of the rights and privileges of a member, except to pay the Conference any obligations then or thereafter becoming due.

A member may be expelled for any of the following reasons: Failure for a period of thirty days to discharge or meet any obligation to the Conference; Failure to comply with lawful orders issued by the Board of Trustees; Failure to do any things required by the Code of Regulations, By-Laws, or agreements of the Conference; The doing of any act or thing detrimental to the welfare of the Conference.

The Board of Trustees may act upon the expulsion of any member upon written complaint made to it by any member. Upon the receipt of a complaint, the Executive Secretary shall, when directed by the Board of Trustees, transmit in writing to the accused member a notice, stating the charges made against him, and fixing a time and place for a hearing before the Board of Trustees. The accused member shall appear before the Board of Trustes, in his own defense to the charges made against him.

The Board of Trustees shall have the right to expel, or exonerate, the offending member, and shall report its action to the next regular meeting of the Conference. The Conference shall not reverse the action of the Board of Trustees, except, upon the affirmative vote of two-thirds of its members in good standing. From and after such meeting, an expelled member shall cease to have the rights and privileges of this Conference, and shall no longer be subject to any duties connected with such membership, except, the obligation to pay any and all amounts due from him to the Conference, and the Executive Secretary shall cancel his name from the membership roll.

Article V
Representation

The Secretary, or other duly authorized officer of affiliated associations acceptable to the Board of Trustees, shall serve, and be recognized as representative of the respective organizations upon presentation of credentials properly executed. Individual members shall be repre-

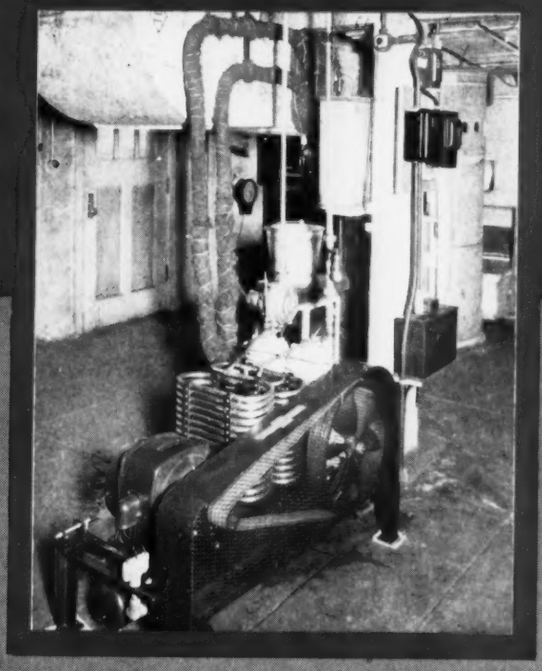
(Continued on page 79)

DEVOT

AMERICAN ARTISAN

RESIDENTIAL AIR CONDITIONING

SECTION

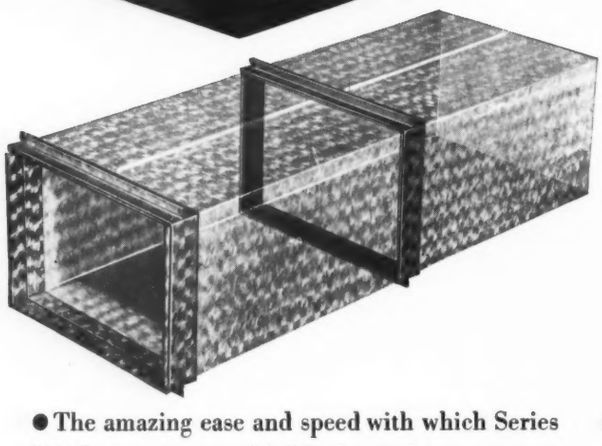


DEVOTED TO HOME AND SMALL COMMERCIAL AIR CONDITIONING

LAMNECK SERIES 700 SYSTEM PREFABRICATED DUCT AND FITTINGS

A NEW TYPE CONNECTION FOR DUCT AND STACK–

An Advanced Idea Unparalleled in the Industry



Simplifies and Speeds Up Duct and Stack Assembly . . . Reduces Air Resistance

● The amazing ease and speed with which Series 700 System is assembled is due in large measure to a marvelous new type Duct and Stack Connection originated by Lamneck.

This exclusive new Lamneck feature is a separate unit into which the unformed ends of the Duct and Stack can be slipped easily without the aid of tools. The Connection is made with a *positive automatic lock* which holds the Duct and Stack securely in place. Notching of Duct, Stack or Fittings is eliminated, thus providing a tight, rigid joint, free from leakage or rattles. The need of large or small ends of duct at the joint is also avoided.

The new Lamneck Connection provides a more substantial assembly which sets a new low in installation cost. At the same time it insures a more efficient and better looking job. Finally, it leaves the inside of the Duct perfectly smooth, offering little or no resistance to the flow of air in either direction. This feature is of greatest importance in efficient air distribution.

Lamneck Series 700 System has everything it takes to make installation speedy, efficient and economical.

Write for Name of Your Nearest Distributor.

LP INC.

LAMNECK PRODUCTS, INC.

414 DUBLIN AVENUE • COLUMBUS, OHIO

PREFABRICATED DUCT AND FITTINGS FOR ALL TYPES OF RESIDENTIAL WARM AIR HEATING AND AIR CONDITIONING SYSTEMS

GASCO INSTALLATION GUIDE

RECOMMENDED PRACTICES FOR INSTALLATION
OF
GAS WINTER AIR CONDITIONING IN NEW HOMES

For the guidance of Architects, Builders, Contractors, Heating Engineers and Installers as well as to assist the home owner in securing the best in gas winter air conditioning.

PREPARED BY
METROPOLITAN HEATING AND AIR CONDITIONING COUNCIL
In Cooperation With The
METROPOLITAN SERVICE MANAGERS COUNCIL
NEW YORK

The Gasco Installation Guide [Part 2]

In the May issue we published part I of this guide for gas-fired, winter air conditioning installations. This part 2, completes the code. It was pointed out in May, and should be repeated here, that this guide only "suggests" and is not law, but self enforcing. Gas utility companies, faced with cheap and poor installations, through a committee, prepared the code. Persons or firms interested, can secure more information from the editors.

VI. Air Ducts

A. General

1. The duct systems should be designed to meet established standards for air delivery and quiet operation and be reasonably air-tight.

2. The National Fire Protection Association suggests that the return of air from the first floor to the basement through open registers and without continuous ducts be prohibited; also the taking of air from any basement section not used for living quarters.

3. Ducts and fittings should be constructed with double-locked seams, connected at joints with standard "S" and drive slips or by an equivalent method.

4. Asbestos tape is recommended on each joint in the duct work to assure air tightness.

5. No first floor riser stack should have less than eighteen (18) sq. in. in cross sectional area nor any dimension less than three (3) inches. No second or third floor riser should have less than 28 sq. in. cross sectional area or any dimension less than 3". No trunk or basement branch should have a ratio of width to depth of more than four (4) to one (1). No riser stack should have a ratio of width to depth of more than four (4) to one (1). The above limitations may be slightly exceeded for lengths of not over five (5) feet.

6. The distribution system should be designed so that the required static pressure for the system, including the filters, does not exceed the manufacturer's rating on the fan of the unit selected. According to the A.S.H.V.E. GUIDE, air velocities in the main trunk system of 750 ft. per minute, branch duct velocities of 600 ft. per min., and wall stack velocities of 500 ft. per min. are typical for medium speed design. The volume of air to be handled is determined as shown in Section II. B., 1.

7. Risers should be constructed of material not lighter than 28 gauge galvanized iron or equivalent. Plenum chambers and trunks should be constructed in accordance with the following schedule of weights and sizes:—

Gauge	*Width*	*Seam*	*Reenforced Seam*
28	Up to 12"	1"	.....
26	13" to 18"	1"	.....
24	19" to 30"	1"	⅛" x 1"
22	31" to 60"	1½"	⅛" x 1⅜"
20	61" to 90"	1½"	⅛" x 1⅜"

8. All elbows should be of double-radius construction or be equipped with multiple vanes (duct-turns). All double-radius elbows should have a center-line radius of not less than seventy-five (75) per cent of the width of the duct.

9. Boxing of stud or joist spaces should be avoided on return ducts. It should never be used on supply ducts.

10. If a room requires more than 150 cfm, it is best to use two or more supply openings to bring about better room circulation.

B. Supply Ducts

1. Supply ducts should be designed to heat each room to a comfortable temperature when the outside temperature is 0°, (Use local design temperatures in specifications) (Refer to Section VI., A., 6).

2. If supply ducts are run in outside walls, they should be thoroughly insulated.

3. If garages are to be heated, a separate branch direct from the heater unit should be run. The register should be of the automatic back-draft damper type.

4. Supply ducts in cold unexcavated spaces, unheated attics, garages, and the like should be insulated with at least one (1) inch insulating material.

5. In heating basement recreation rooms, it is advisable either to fur the walls and use double floors or to oversize the supply duct. This is necessary to counteract heat losses through bare basement walls and to take care of the pick-up load due to intermittent heating. Better results will be obtained by adding 20 per cent to the calculated air delivery for recreation rooms.

6. Because of tendencies of rooms over garages to cool off quickly, it is advisable to figure them with three air changes per hour and to treat floors as an outside exposure. A separate branch duct should be run to rooms over garages and floors should be thoroughly insulated.

7. A separate riser should be provided for each supply register.

8. A canvas connection (not lighter than 12 oz. and not drawn tightly) should be provided between the unit and the supply plenum chamber.

C. Return Ducts

1. The return duct system at its most restricted point should have a cross-sectional area of not less than eighty-five (85) per cent of the area of the supply system at the outlets of the air conditioning unit.

SOME OF THE STRUCTURAL DETAILS FOR GOOD DUCT WORK PRACTICE

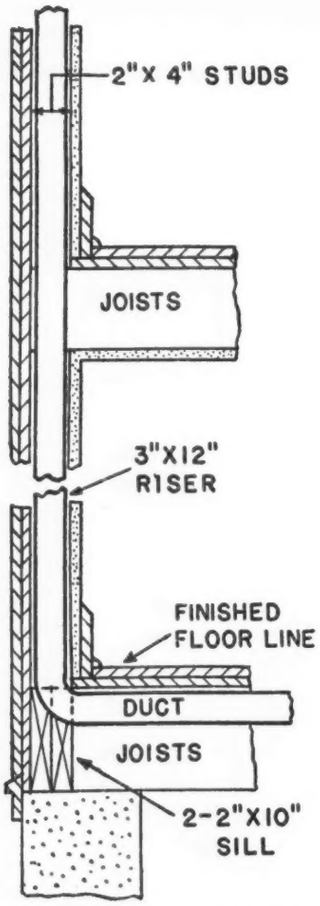


Figure 1. A Variation of the Sill, Introducing a Riser without Serious Cutting.

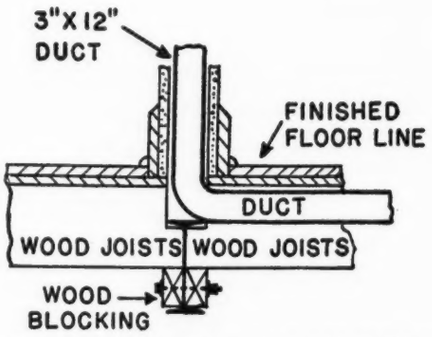


Figure 3. Suggestion to Avoid Cutting Main Beam to Provide for Riser.

Figure 2. Branch Connection Take-off.

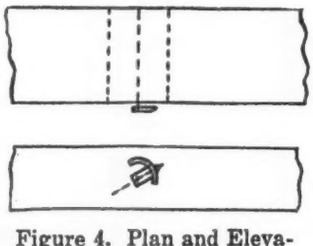


Figure 4. Plan and Elevation of Volume Damper.

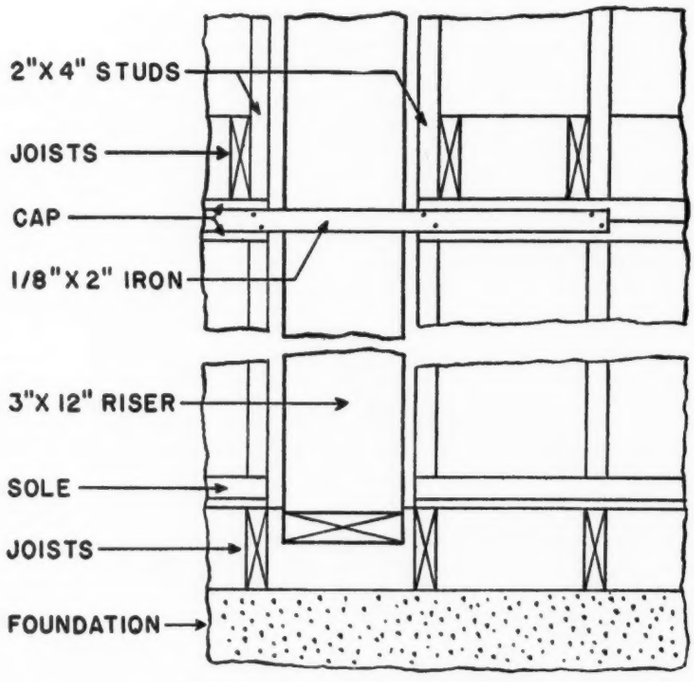


Figure 5. The Use of a Reinforcing Iron Plate where a Duct Cuts thru a Partition Cap.

7

2. A canvas connection (not lighter than 12 oz. and not drawn tightly) should be provided at the junction of the cold air return duct and the fan housing inlet.

3. If return grilles are located very near the fan so that its noise could be readily transmitted, the branch or trunk duct to that point should be lined with fireproof acoustic material for a length sufficient to provide an effective sound trap.

D. Dampers

1. Volume dampers with positive locking devices should be installed in each supply trunk adjacent to the plenum chamber.

Volume dampers with positive locking devices should be installed in each branch about 6" to 12" from the point of take-off.

Volume dampers should also be installed in all return ducts.

Stack-head dampers should only be used in connection with the installation of a volume damper or when a volume damper is impossible to install or when it would be difficult to adjust it when installed.

Since splitter dampers produce considerable turbulence, it is better to install transition fittings at all branches. The trunk size should be reduced immediately after the take-off and from the take-off side. This is illustrated in Figure 2.

Good design will avoid a branch taken off the inside radius of a curve in a trunk duct or immediately following the curve. However, if it is impossible to avoid such a construction, a splitter damper should be used.

2. An indicator should be provided on each volume and splitter damper which will indicate the open and closed positions of the damper.

3. Freedom of operation of all dampers should be carefully checked after installation.

4. If an outside cold air intake is used, a tight-fitting damper should be installed therein.

E. Supports

1. Supports and reenforcements should be as prescribed by Local Building Regulations.

2. Full support of all risers and fittings should be to studding and joists with heavy galvanized band iron.

3. Heavy galvanized band iron or equal should be used for the full support of the entire basement system from ceiling joists.

4. Whenever the cutting of the main structure of the house is necessary for the reception of a riser or return, this member should be reenforced with a suitable iron band at least 2" x ⅛" securely fastened on each side of the plate and should extend at least one stud space on each side of the space or spaces which have been cut. See Figure 5. (Consult Local Building Code.)

VII. Registers and Grilles

A. General

1. Registers and grilles should be of the type specifically designed for air conditioning systems and should be the full width of the stack.

2. Manufacturer's ratings should be used for volume, velocity, and areas required.

B. Supply Registers

1. Registers installed in walls should be supplied with frames securely fastened to studding and tightly assembled to the stack-head to preclude air leakage.

2. Registers should be assembled against gaskets to prevent streaking.

3. All registers except one, preferably the one supplying the room where the thermostat is located, should be provided with a valve operated from the face.

4. Each room in which heat is desired should be provided with at least one supply register.

5. Low supply registers are recommended and they should have a maximum register velocity of three (300) hundred feet per minute. Downward deflecting registers permit velocities up to five hundred feet per minute.

6. High supply registers are likely to cause ceiling streaking but when used they should be designed for a high register velocity of from five (500) to six hundred (600) feet per minute (except in bathrooms and toilets) and should be provided with adjustable horizontal vanes. Where the distance from the register to the opposite side of the room is over 15 ft., higher velocities should be used. The register top should be at least 18" from ceiling to help prevent streaking.

C. Return Grilles

1. Return air should be brought back from as many rooms as possible except from kitchens, pantries, bathrooms, and garages.

Care should be taken to draw from each room or series of intercommunicating rooms air equivalent to the amount designed to be delivered to the room or series of rooms; also that the total air to be returned shall, in no case, be less than the total equivalent supply of warm air to all rooms unless compensated for by the admission of outside air.

2. Care should be exercised, especially in living rooms, in the placement and number of return air grilles so as to preclude drafts.

3. All grilles in bedrooms should be provided with a valve operated from the grille face.

4. A separate return riser should be provided for each return grille.

5. Floor grilles are not recommended but where used they should be installed flush with the floor and be removable for cleaning the duct.

VIII. Filters

Systems should be equipped with fire-proofed filters for cleaning the air. "Throw-away" type filters are desirable. Generous filter areas are advisable to counteract reduced capacities and increased resistances when dirty. The manufacturers' ratings and recommendations should be followed for resistances and efficiencies.

Filters should be easily accessible for removal with sufficient clearance provided for this purpose.

All risers should be capped during construction periods.

If the system is to be operated prior to occupancy, filters should be installed, but clean ones should be installed before occupancy.

IX. Electric Connections

Electric connections should be made direct from the main fuse panel. The automatic gas valve and the fan motor should be on the same fuse circuit. The clock should be fused separately.

X. Balancing Systems

The house heating system should be balanced to the customer's satisfaction under winter operating conditions, after the house is occupied. All dampers and louvers should be set in a locked position after the balancing adjustments have been made to secure proper distribution of air and heat to all parts of the premises which are to be heated or conditioned.

XI. General

Attention is directed towards the fact that cold floors cause unsatisfactory heating conditions, and it is therefore urged that whenever floors are situated over unexcavated spaces or ventilated spaces, such as garages, that suitable insulating materials be properly applied to such portion of the floor.

All installations should be made in a neat and workmanlike manner.

The complete duct lay-out should be in the hands of the general contractor before he starts actual framing. As a guide to proper duct work the five figures on page 7 may be useful to the heating contractor as well as to the general contractor. Figures 1 and 3 may be drawn to the attention of the general contractor so as to assist him in providing for the installation of heating ducts.

Air Conditioning Facts From the Research Residence

Calculation of Air Volumes for the Cooling Load

By S. Konzo
Special Research Assistant Professor
Engineering Experiment Station
University of Illinois

IN the two preceding issues a method was presented for calculating the total cooling load, or summer heat gain, for a building. The sources of heat gain were considered as consisting of:

Item 1—Heat Transmission through walls not exposed to sun.
Item 2—Heat Transmission through walls exposed to sun.
Item 3—Heat Transmission through windows and doors not exposed to sun.
Item 4—Heat Transmission through windows exposed to sun.
Item 5—Heat Transmission through ceilings.
Item 6—Heat Transmission through floors.
Item 7—Heat brought in by infiltration or ventilation air.
Item 8—Heat given off by occupants.
Item 9—Heat given off by electric motors.
Item 10—Heat given off by electric lights.
Item 11—Heat given off by appliances.

The sum of the hourly heat gains, as determined from items 1 to 11 inclusive, enable the designer to select the size of the cooling unit required to not only cool the air, but also to condense moisture from the air. The calculations for determining the air volumes for the cooling load also involve the sum of items 1 to 11, except that a slight modification is required in subtracting out the moisture load, as will be shown in the following section. Ordinarily item No. 7 is the only item that requires modification in this respect. By neglecting this modification and by using the total heat gain for the calculation of the air volume, a larger value

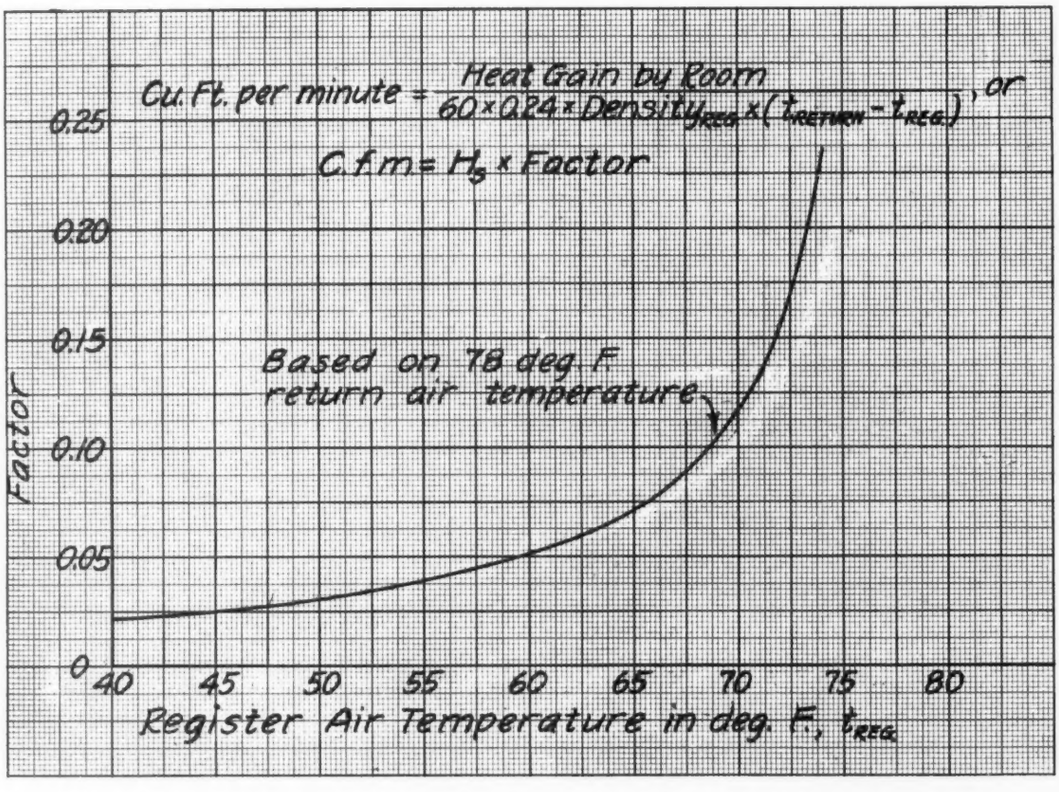


Fig. 1—Chart for selecting "Factor" to be used in determining air volume from Btu heat gain.

for the air quantity will be obtained than is actually required. In some cases and particularly for places of heavy occupancy and large fresh air load, this difference may become quite appreciable. As a general rule, however, no serious difficulties will arise if the air volume used is actually larger than the minimum requirements demand. In the following section the precise method for determining the net heat quantity to be considered in the air volume calculations will be presented.

Heat Absorbed in Changing the Temperature of Air

In determining item 7, which represents the *total* amount of heat required to cool and dry the air brought in by infiltration or by ventilation, equation 1 was used:

$$H = Q \text{ (density) } (i_o - i_i) \ldots\ldots\ldots\ldots (1)$$

in which,

Q = Ventilation or infiltration air in cu. ft. per hour.

density = Density of outdoor air. This is equal to approximately 0.071 for air at 95 deg. F.

i_o = Enthalpy of outdoor air, in Btu. per lb. (See Table 2 in April issue)

i_i = Enthalpy of indoor air, in Btu. per lb. (See Table 1 in April issue)

Example 1

Given 500 cfm. of air brought in for ventilation. Then $Q = 500 \times 60 = 30{,}000$ cu. ft. per hour.

Outdoor design dry-bulb temperature = 95 deg. F., wet-bulb temperature = 75 deg. F. Then i_o = 38.46 Btu. per lb.

Indoor design dry-bulb temperature = 78 deg. F., wet-bulb temperature = 65.3 deg. F. Then i_i = 30.19 Btu. per lb.

Solution

$H = (30{,}000)\ (0.071)\ (38.46 - 30.19) = 17{,}615$ Btu. per hr.

This value of H represents *both* the heat required to condense the water vapor in the air as well as the heat required to change the temperature of the air. That is,

$$H = H_l + H_s \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

in which,

H_l = heat absorbed in condensing moisture, commonly referred to as the latent heat loss, and

H_s = heat absorbed in lowering the dry-bulb temperature of air, commonly referred to as the sensible heat loss.

The moisture term, H_l, does not enter into the calculations for determining the required air volume. The procedure therefore, in determining the heat quantity involved in the air volume calculations is as follows:

(a) Determine sum of heat gain items 1 to 11 inclusive, with the exception of item 7.

(b) Use equation 3 to determine the heat absorbed in lowering the temperature of the ventilation air.

$$H_s = Q \text{ (density) } (0.24) \ (t_o - t_i) \ldots . (3)$$

in which,

Q = ventilation or infiltration air in cu. ft. per hr.,

density = density of outdoor air. This is equal to approximately 0.071 lb. per cu. ft. for 95 deg. F.,

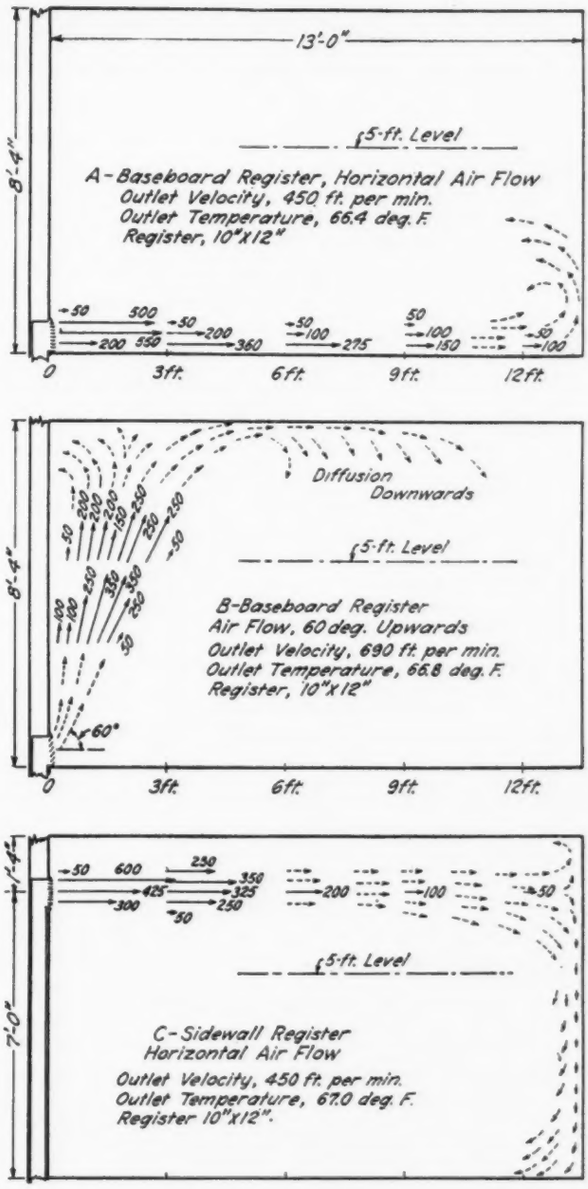


Fig. 2—Diagrams showing air circulation in a room with three types (two locations) of outlets. (Univ. of Ill., Eng. Exp. Station Bulletin 305).

0.24 = specific heat of air,

t_o = outdoor design dry-bulb temperature in deg. F.,

t_i = indoor design dry-bulb temperature in deg. F.

Using the same values as in example 1, the value of H_s will be:

$H_s = (30{,}000)\ (0.071)\ (0.24)\ (95.0 - 78.0) = 8{,}690$ Btu. per hr.

Therefore, approximately half of the total heat quantity determined for item 7 is required to change the temperature of the air, the remaining half being required to condense moisture.

(c) For precise determinations, heat gain item 8 consisting of "heat given off by occupants" and heat gain item 11 consisting of "heat given off by appliances" should also be treated in a similar manner. That is, the heat required to change the temperature of the air should be determined independently from

the heat required to condense moisture given off by the occupants or by appliances. In residences and rooms having a small occupancy load such refinements in calculations are not necessary. For restaurants and other congested places, in which the moisture load is appreciably large, such determinations should be made from data similar to those shown in Table 1. The values in the last column show the heat required to change the air temperature.

TABLE 1
HEAT LOSS FROM INDIVIDUALS*

Activity	Total Heat Loss, B.t.u. per hr.	Moisture Loss, H_e B.t.u. per hr.	Temperature Loss, H_s B.t.u. per hr.
Seated at rest, apx.....	400	175	225
Office worker, moderately active	490	265	225
Clerk, standing, moderately active	600	375	225
Walking, 2 mi. per hr.....	761	511	250
Walking, 4 mi. per hr.....	1390	938	452
Very severe exercise.....	2560	...	...

**Values determined from work of F. C. Houghten and others as published in the ASHVE Guide, 1939.*

Similar values for appliances, heat gain item 11, may be estimated from values published in the A.S.H.V.E. Guide or the Refrigerating Engineering Handbook.

(d) As stated previously, the sum of the heat gain items 1, 2, 3, 4, 5, 6, 9 and 10, and those portions of items 7, 8 and 11 which can be attributed to the heat required to change the temperature of the air, constitutes the net heat to be used in determining the air volume requirements.

Equation of Air Volume Requirements

The required air volume, in cu. ft. per minute, may be determined from equation 4.

$$\text{Cfm.} = \frac{H_s}{(60)\ (0.24)\ (d)\ (t_r - t_{reg})} \quad \ldots . (4)$$

in which,

H_s = heat gain in Btu. per hr. as determined from the preceding section,

d = density of air corresponding to temperature of air entering room, in lb. per cu. ft.,

t_r = dry-bulb temperature of air leaving room through the return air grilles, in deg. F. This has been assumed as 78 deg. F. in the following calculations,

t_{reg} = dry-bulb temperature of air entering the room in deg. F.

TABLE 2
FACTOR TO BE USED IN EQUATION
C.F.M. = $H_s \times$ FACTOR

Temperature of Cooled Air Entering Room, in deg. F.	Factor
40	0.022
45	0.025
50	0.031
55	0.039
60	0.051
62	0.057
64	0.066
66	0.077
68	0.093
70	0.117
72	0.155
74	0.233

Equation 4 can be simplified to the form shown in Equation 5.

$$\text{cfm.} = H_s \times \text{Factor} \quad \ldots . (5)$$

The numerical values for the "Factor" are shown in Table 2 and Fig. 1. It may be noted that the value of the Factor is quite small for register air temperature less than approximately 60 deg. F. That is, the quantity of air required to be circulated is small when the register air temperature is low. However, in order to obtain low register air temperatures, the mean coil temperature of the cooling coils should also be low. In most plants the limitations of the plant itself will automatically impose a minimum coil temperature, and hence also impose a minimum register air temperature permissible in the given installation. Incidentally, the introduction of cool air at temperatures below 60 deg. F. requires that great precautions should be taken to prevent the air from striking the occupants in the room. See Fig. 2.

The Factor shown in Fig. 1 increases rapidly for register air temperatures exceeding about 70 deg. F. Hence, as higher air temperatures are used, larger air quantities are required in order to handle the same cooling load. Obviously, therefore, the use of register air temperatures exceeding about 70 deg. F. will require a larger fan and larger operating cost than if a lower value of the register air temperature were used. The range of register air temperatures in common use lies between 60 and 70 deg. F.

Example:

Given a total heat gain (H) of 30,000 Btu. per hr. consisting of a moisture load (H) of 5,000 Btu. per hr. and a temperature load (H_s) of 25,000 Btu. per hr.

What quantity of air circulation will be required for register air temperatures of 60, 62, 64, 66, 68 and 70 deg. F. respectively?

Solution:

Use equation 5. Select values for Factor from Fig. 1 or Table 2. Cfm. = $H_s \times$ Factor = 25,000 $\times$ Factor.

For:

60 deg. F., Cfm. = 25,000 $\times$ 0.051 = 1,275 Cfm.
62 deg. F., Cfm. = 25,000 $\times$ 0.057 = 1,425 Cfm.
64 deg. F., Cfm. = 25,000 $\times$ 0.066 = 1,650 Cfm.
66 deg. F., Cfm. = 25,000 $\times$ 0.077 = 1,925 Cfm.
68 deg. F., Cfm. = 25,000 $\times$ 0.093 = 2,325 Cfm.
70 deg. F., Cfm. = 25,000 $\times$ 0.117 = 2,925 Cfm.

It may be observed that a few degrees difference in temperature of the incoming air into the room is reflected in an enormous difference in the air requirements. Hence, cooling systems in which low mean coil temperatures are attainable will be required to handle a smaller quantity of air than those systems in which low mean coil temperatures are not attainable.

Furthermore, the importance of insulating all ducts passing through heated spaces becomes evident. Any heat gain of the cool air being carried in the ducts will

result in an increased register air temperature, and possible unbalance in the temperature distribution within the cooled space.

Unless suitable precautions are taken to reduce the summer heat gain by the use of awnings and similar appurtenances, the air volume requirements for winter heating and summer cooling for a given structure will not be the same. Under certain limited conditions, however, it is possible to so design a given system that the total air requirements for both summer and winter will be the same. In most cases it will be found necessary to base the winter heating design on a low register air temperature, much below the usually accepted design value of 135 deg. F. However, the fact that the same total air volume requirement for summer and winter is obtained, does not imply that the same damper adjustments in the duct system can be used. For example, a room having only a north exposure may have a substantially large heating load when compared to the total heating load, and yet have a small cooling load when compared to the total cooling load. Hence, in year-round air conditioning systems it is most essential that the duct system be balanced separately for the two seasons, and that the positions of the dampers be clearly indicated so that the changes can be rapidly made.

Resistance of Cooling Coils

Since the addition of cooling coils adds an extra resistance to the existing duct system the usual procedure is to install the coils in a by-pass arrangement so that for the winter heating system the resistance of the

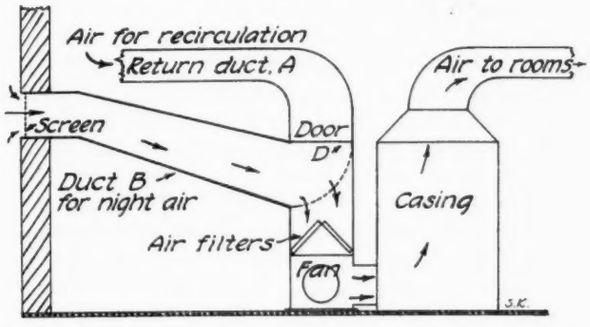


Fig. 3—Diagram of duct arrangement for night cooling using basement fan of the forced warm air heating system.

cooling coils is not added to that of the remainder of the duct system. With this arrangement the total resistance against which the fan delivers air will be usually greater during summer than during the winter season. In all cases the system should be designed to deliver air against that combination of air volumes and pressure losses which imposes the greatest load on the fan. If, as usually is the case, the summer air volume demand is the greater of the two, the fan and the fan motor should be selected to handle that demand. A check calculation of the winter air volume and pressure losses will indicate to what extent the fan speed can be reduced to handle the lesser demand.

In every cooling installation some provision for introducing fresh air into the inlet side of the fan should be made. Infiltration during the summer season is not as great as during the winter and, in addition, odors are accentuated in the warmer and more humid atmosphere that prevails in the summer. As indicated in the April issue, the introduction of fresh air amounting to one air change per hour was found to be most satisfactory in the Research Residence. Minimum requirements demand from 15 to 25 cfm. per person depending upon whether much smoking or cooking odors are present. Such fresh air ducts should be sized and fitted with dampers just as any other return air duct in the system. Furthermore, the opening of the fresh air duct at the building face should be provided with a set of louvers to prevent rain from entering the duct and with a close grained screen to prevent the entry of leaves and insects. In this connection some installers have found that horizontal, adjustable-vane type registers which are equipped with a valve that can be closed from the outside will serve adequately. Since the register is exposed to the elements a unit should be selected which will not rust or corrode.

Sizing Furnace Fan for Night Air Cooling

Another item in connection with the duct system that should be given serious consideration in designing any forced air system is the provision for possible use of the main fan for circulation of night air. See Fig. 3. In many cases the installation of a separate duct from a window to the inlet of the fan is not possible nor desirable. In such cases the duct from the window to the fan may be omitted and a slide damper provided in the inlet side of the duct leading to the fan which may be easily opened at night. During the night the air can be admitted through the open window and allowed to enter the fan. During the day the slide damper can be closed and the fan can be operated to recirculate the air. The success of any night air cooling installation, or for that matter any mechanical cooling system, will depend upon having the house closed up tightly during the day to prevent the entry of the hot outdoor air. The air conditions in a room which is entirely closed are not satisfactory under summer conditions and can only be relieved by the constant circulation of air, part of which comes from the outdoors. Such provisions can be readily made in any forced air system and should be installed in such a manner that the home owner can readily make the few changes necessary in the damper position each morning and night.

An inspection of the cooling coils used in the Research Residence plants have indicated the necessity of filtering all the air that enters the cooling coils. Lint and dirt which accumulates upon the coils will in time tend to reduce the effectiveness of the cooling coils and give cause for complaint.

◆ ◆

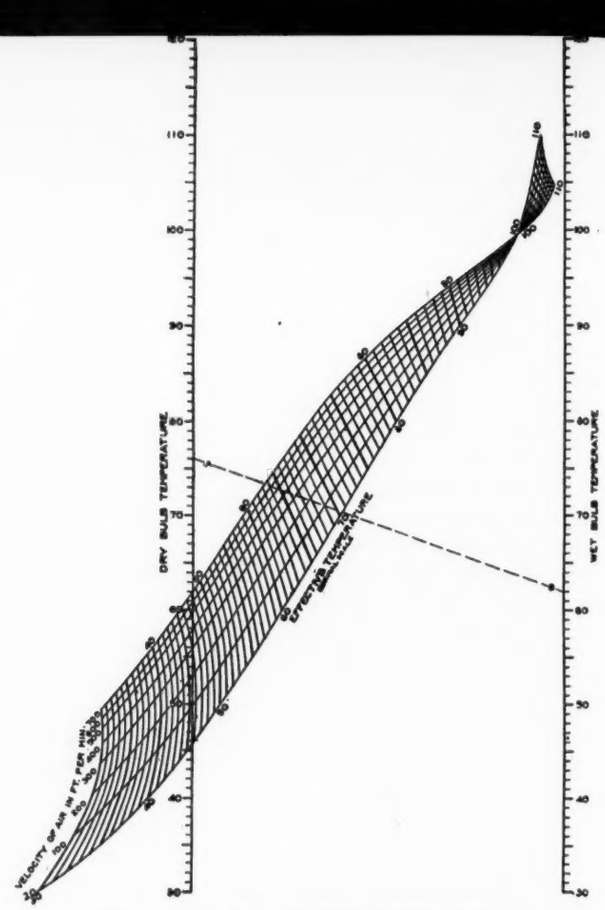
Erratum—In the April issue, page 110, the "0.24" should be omitted from equation 7 and in the solution to the example. The solution should be H = (30,000) (0.071) (38.46 — 30.19) = 17,615 Btu per hour. Correct equations are in this article.

Effective Temperature*—

Key to the proper selection of satisfactory cooling design conditions—

By R. E. Gould

Frigidaire Division, General Motors Corp.



Effective temperature chart showing normal scale of effective temperature. Copyright, American Society of Heating & Ventilating Engineers. Reprinted by permission—From ASHVE Research Report No. 717, Effective Temperature with Clothing by C. P. Yaglou and W. E. Miller, Transactions, Vol. 31, 1925.

IN any air conditioning job the first things to be considered are what climatic conditions prevail in the locality and what are the desired, internal conditions which must be maintained.

Regarding outdoor conditions there are now available several excellent compilations of weather data[1] which serve to present rather a complete summary of our knowledge on this matter. These data include reasonable, maximum, dry bulb air temperatures, wet bulb temperatures, dew point temperatures, wind velocities, and hours of sunshine for the entire U. S. Even for the layman these should provide some interesting facts; for example, it may be a bit disconcerting to realize that the same peak, dry bulb temperatures for the summer are encountered in St. Augustine, Baltimore, St. Paul, Houston, Milwaukee, and Dayton. Also, East of the Mississippi the average number of hours of sunshine per day is nine whereas the West averages around eleven.

The outdoor conditions exert a very direct influence on the load which the air conditioning equipment must overcome, and, therefore, the original selection of representative, outside conditions is quite important since it affects the first cost of the system, the operating cost, and the manner in which the system meets the requirements in supplying proper air conditioning.

1. *Analysis of summer weather data in the United States by J. C. Albright, A. S. H. & V. E. Journal, 1939.*

*Excerpted from a paper by the author, "Refrigerating Problems in Comfort Air Conditioning," delivered at the Second Conference on Air Conditioning at University of Illinois, Urbana, March 8, 9, 1939.

Furthermore, much discussion has centered about selection of indoor conditions for optimum comfort, but it is not the purpose of this paper to promote any specific opinion. In order that the following topics regarding the selection of the proper inside conditions for design purposes may be better understood, a brief explanation of the term "Effective Temperature" must be included. As a measure of the degree of warmth or coolness felt by the human body in response to temperature, humidity, and air movement, an empirically determined index called the Effective Temperature has been devised.

The numerical value of the Effective Temperature for a certain condition is fixed by the temperature of calm, saturated air which induces the same feeling of warmth or cold, as one experience under the specified conditions.

Principles of Effective Temperature

Through a long series of experiments, a relation has been tentatively established between the correct Effective Temperatures to be maintained and various outdoor conditions. This indicates that for an outside dry bulb temperature of 100° F. an Effective Temperature of 75° should be maintained for air velocities of below 25 ft. per minute indoors; and for each drop of 5° in outdoor temperatures, the Effective Temperature should be lowered 1°. While this seems to establish inside conditions rather definitely for each locality, there are many factors which

have a bearing on inside conditions, and it probably will be of interest to rather hurriedly review a few facts brought out recently.[2]

When maintaining a 72° Effective Temperature with the outdoors at 84.8° Dry Bulb (which is in agreement with the above mentioned schedule) the maximum number or about 90% of the occupants were comfortable throughout the day, whereas those who were too cool, and those who were too warm each totaled about 5%. Of this particular, experimental group of persons which was comprised of close to 100 people, the men preferred an Effective Temperature of 71° which was about 2° lower than that preferred by women.

The importance of maintaining proper temperatures is indicated by the fact that if the Effective Temperature is carried just 1° below the optimum for men, 70% of the women occupants will be uncomfortable and dissatisfied. A much happier choice is to lean the other way slightly, and design for a slightly higher Effective Temperature.

"Cold Shock"

This has another angle to it, namely, in mediating somewhat the so-called "cold shock" which is sometimes experienced when entering a cooled zone. At Effective Temperatures of 71° or lower, the percentage of people uncomfortable upon entering a conditioned space increases rapidly as does also the time for these people to become "acclimated." By maintaining the optimum Effective Temperature for occupancy of an hour or more, those voicing cold shock will be less than 5%, and the average duration of discomfort will be less than 15 minutes.

To even further reduce these complaints by raising the Effective Temperature results in a much larger percentage of uncomfortable, long-time occupants. Therefore this practice must be limited to zones of transient occupancy such as small shops, etc. Nevertheless a legitimate increase of 2° in the design Effective Temperature for those short occupancy situations must not be overlooked by the application engineer as such a decision can materially affect the size and cost of the equipment selected.

"Warm Shock"

While the subject of the proper conditions to be maintained indoors may be considered by some to be related to the so-called "warm shock" which is experienced when leaving a cooled space, the latter phenomenon is probably much more closely associated with the actual existing outdoor temperature. If the temperature outdoors is extreme in either direction, summer or winter, people are uncomfortable as they step outdoors and they remain uncomfortable to an extent depending on the weather.

In a minor way the actual sensation of warm shock is influenced by the conditions in the cooled zone, in that for a pre-determined Effective Temperature, i.e., 72°, a wide latitude of combinations of dry bulb temperatures and humidities may be maintained.

EFFECTIVE TEMPERATURE 72°

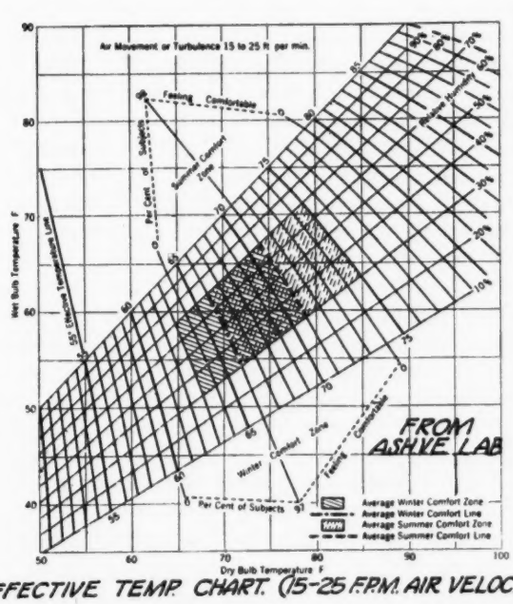
(Air Velocity 25 Ft. Per Minute or Less)

Dry Bulb Temperature	Percent Relative Humidity
75.0	70
76.0	60
77.5	50
79.0	40
80.5	30

If a combination is selected at the high relative humidity end of this range, a sensation of a "furnace-like" heat and dryness is encountered when a person steps outdoors. If the low relative humidity range is chosen, a transitional sensation of warmth and dampness is experienced, which may be likened to the sensation of pouring warm water on the skin. Recovery from either reaction is fairly rapid and any retained feeling of discomfort, as stated previously, is then a function of the actual state of the weather.

Thus, it may be noted that from the standpoint of the comfort reaction of the public, the proper selection of internal design conditions to conform to outdoor conditions is quite a complicated and refined art, depending as it does, on many variables. The major factors and their effect as briefly outlined in the foregoing, serve to set forth the reasons for the very existence of summer air conditioning, in that the attempt to provide an atmosphere wherein the majority, regardless of weather conditions, may be comfortable to the extent of being unconscious of the operation of an air conditioning system is considered by the public as being a commendable fait accompli.

2. *"Reaction of Office Workers to Air Conditioning in Southern Texas," by A. J. Rummel, S. E. Giesecke, W. H. Badgett, A. T. Moses, A. S. H. & V. E. Journal, 1939.*



EFFECTIVE TEMP. CHART. (15-25 F.P.M. AIR VELOCITY)

ASHVE Comfort Chart for air velocities of 15 to 25 feet per minute showing winter and summer zones of comfort. Copyright American Society of Heating and Ventilating Engineers—From ASHVE Transactions, Vol. 38, 1932.

Pattern Development for

Air Conditioning Fittings*

By William Neubecker
Head Instructor
Sheet Metal Department, New York Trade School

WHEN two round pipe "Y" branches are taken off the end of a rectangular main, two types of transitions can be used. The first or splitter type is shown in Fig. 38. This is a fitting to be used at the end of a rectangular trunk line, when the two round pipe branches make a double transition with the end of the rectangular main. For each air distribution we can assume that the round pipes are each 6¾ in. diameter and for equal friction the rectangular duct should be 8x9 inches with 8 inches as the depth of the duct. This is clearly shown in the side elevation plan, end view and sections.

Here we have two round pipe branches forming a "Y" as shown in the plan and end view, which is to be 12 inches long as shown in the side elevation. The diameter of the round pipes are each 6¾ in. and each area is 35.78 square inches. $2 \times 35.78 = 71.56$ or say 72 square inches. $72 \div 8$ (the given depth) leaves 9 or 8x9 inch duct, as shown by the dimensions in the end view and sections. Note that each round branch forms a separate transition to one half of the rectangular duct of 8x4½ inches, the pattern for which when developed will answer for both branches.

Using this type of construction, the transition branches meet at the end of the rectangular duct in plan at *S* and forms a splitter 8 inches wide as indicated by the horizontal line *O* in end view which diverts the flow of air. The space between the two round branches in plan has been made 1½ inches. In determining this space, care must be taken not to have too great a space between these two branches, otherwise the area of the branch pipes will be reduced, as explained in connection with Fig. 18 on page 61, June, 1937, issue of AMERICAN ARTISAN.

When drawing the plan view in Fig. 38 the proper width between the two branches can be safely determined as follows: Use *b* in the lower branch in plan as a center, and with *b-c* as a radius describe the arc *c-d*. If the arc *c-d* is tangent to the side of the branch *c-e*, then the area is not effected; but if the arc *c-d* comes on the outside of the line *c-e*, then the space between the two round branches must be reduced. If a given space is required and the ends of the round branches must be at a right angle to the rectangular duct line and should the arc *c-d* come outside of the transition line *c-e*, then *miter lines* must be used to maintain the full area as explained in the June, 1937, issue of AMERICAN ARTISAN above referred to.

*All rights reserved.

As the end view in Fig. 38 shows four symmetrical quarters, as clearly shown by the full size dimensions and sections drawn in their proper relation to the plan, it is only necessary when developing the pattern shape to draw a *one-quarter* end view in Fig. 39 as shown by *A-B-C-7-D*. The opposite dotted side *7-E-F-A* completes the one half end view, but only the *one quarter* end view is used in developing the pattern. Neither side elevation or plan are necessary, but have been shown in Fig. 38 to make the problem clear.

Knowing that the length of the "Y" branch will be 12 inches as shown in side elevation, set off the desired length on the horizontal line *L-X* in Fig. 39 (not scaled). Now divide the half circle in the quarter end view in equal divisions as indicated by the small figures 1 to 7. From points 1 to 4 draw lines to the corner *B* and from points 4 to 7 draw lines to the corner *C*. Draw a line from *A* to 1 and from 7 to *D* (the seam lines). Now at right angles to *A-X* in the true lengths erect the vertical line *X-7*. Take the distances *A* to 1 and *D* to 7 in the quarter end view and measuring from *X* in the true lengths set them off on the line *X-7* as shown by the dots marked *A*-1 and *D-7* respectively.

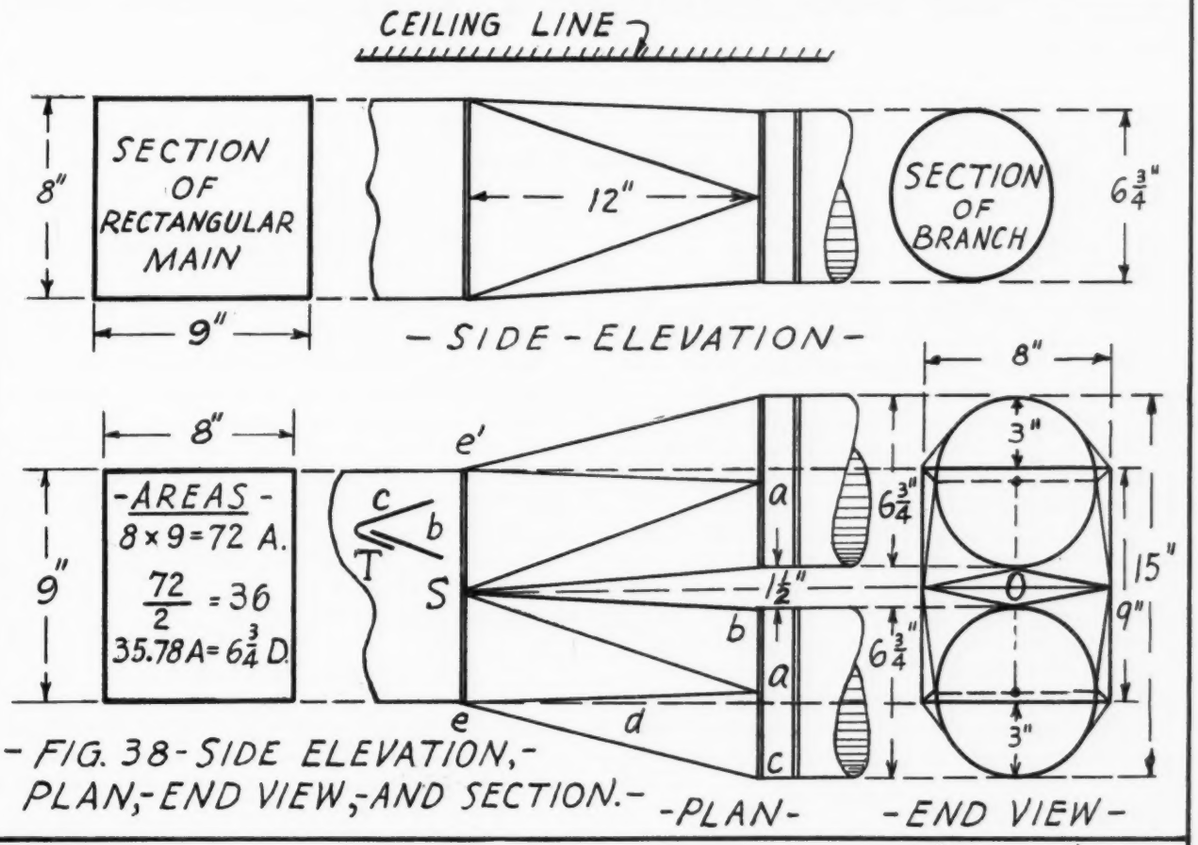
Now take the various distances in the quarter end view, from *B* to 1, 2, 3 and 4 and set them off from *X* in the true lengths, thus obtaining points marked 1-2-3 and 4. Again referring to the quarter end view take the distances from the corner *C* to 4-5-6 and 7 and set them off in the true lengths from corner *X*, and obtain the dots marked *C*-4, 5, 6 and 7. From all the intersections so obtained on the line *X-7*, draw lines to the apex *L*, which will represent the true lengths of similar numbered lines in the one quarter end view.

The one half pattern for one branch can now be developed. Take the distance *B-C* in the one quarter end view and place it as shown by *B-C* in the pattern. With a radius equal to *L*, 1-4 in the true lengths and with *B* in pattern as center, describe a short arc near 4 and intersect it by an arc struck from *C* as center with *L*, *C*-4 in the true lengths as radius. Draw lines in the pattern from *B* to 4 to *C*. With radii equal to *L*-5, 6 and 7 in the true lengths and with *C* in pattern as center, draw short arcs near 5, 6 and 7.

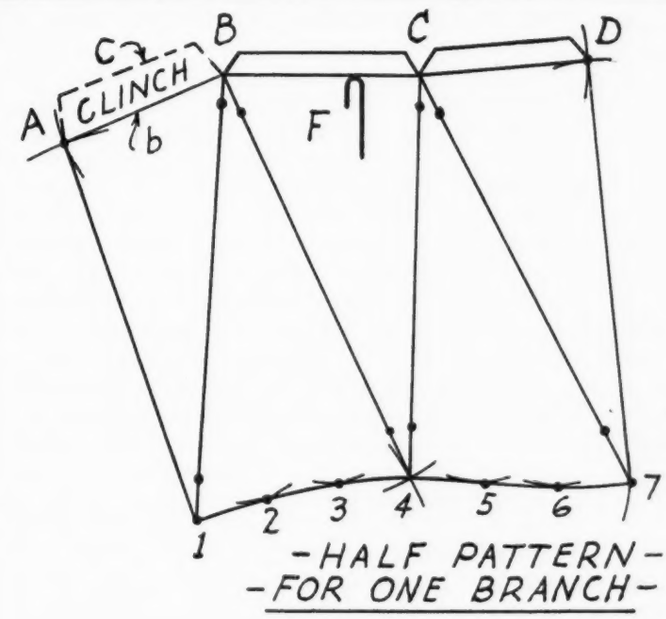
Set the dividers equal to the divisions between 4 and 7 in the quarter end view and starting from point 4 in the pattern, step to arc 5, 6 and 7 and draw a line from 7 to 6. Now with *C-D* in the quarter end view as radius and *C* in the pattern as center, draw a short arc

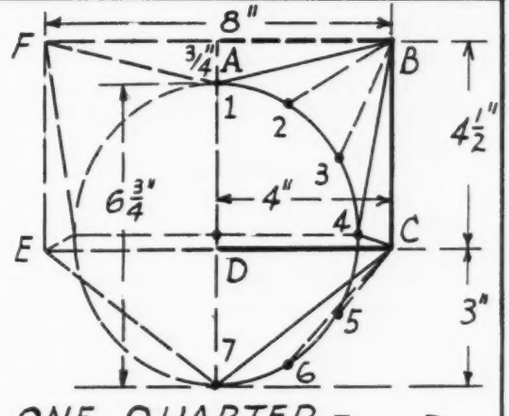
(*Continued on page* 106)

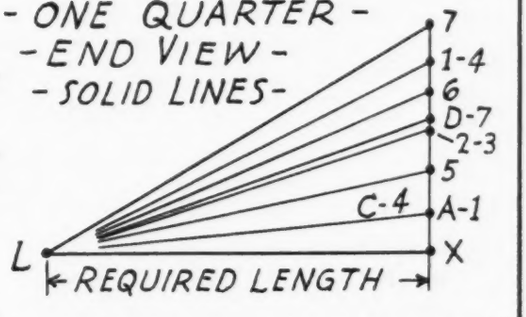
- PATTERN - FOR - ROUND - Y - BRANCH - TAKEN - OFF - - THE - END - OF - A - RECTANGULAR - MAIN - OF - EQUAL - AREA - SPLITTER - TYPE -



- FIG. 38 - SIDE ELEVATION, - PLAN, - END VIEW, - AND SECTION. -







- FIG. 39 - DEVELOPING - PATTERN FOR - Y - BRANCH. -

Sound Control Construction for Mechanical Equipment

By George H. Laws

AIR conditioning and ventilating equipment, in addition to producing comfortable temperature and humidity conditions, should operate quietly. Any noise generated by the system, which might be audible in the conditioned areas should be eliminated, or at least diminished in intensity sufficiently for the system to function without objectionable noises being transmitted to the occupied areas.

Parts of the equipment which should be treated with sound absorbent material include fans, motors, pumps and ducts. Other sources of noise may be the electrical hum from the transformer and motor windings, air vibration resulting from too high peripheral speed of fan wheels and air turbulence set up by the flow of the air through the various units and the air distributing ducts.

In predetermining the kind and extent of sound isolation treatment required, it is well to consider the physical characteristics of the areas to be served by the equipment, such as volume of the room, height of ceiling, furnishings, construction of walls, floor and ceiling, and number of occupants under normal operating conditions. Draperies, floor rugs and the clothing of people all tend to absorb sound waves, thus contributing to the diminishing of objectionable sound frequencies.

Air Noises

Assuming that some provision has been made in the original design of the system to assure quiet operation, there may still remain problems of air borne sound or vibration, or both. Vibration transmitted to the foundation or housing of apparatus, necessitates the use of anti-vibration foundations of absorbent material. Sounds that the mechanical apparatus may radiate to the air, generally require damping treatment on the inside of the ducts and casings, in the equipment room, to reduce to an allowable degree, the original intensity of the sound waves originating from this cause.

Resonance, or resounding will occur when the original sound wave frequency from the apparatus is in tune with the frequency of other material and will in many cases be amplified. It may be necessary to provide sound traps to control this condition.

To control noise generated by the mechanical equipment and by air turbulence, which may be carried through the air distributing system, it is necessary to line the inside of certain portions of the supply and return ducts with sound absorption material, and provide sound isolation construction for the foundations.

Where the maximum in quiet operation must be had, acoustical material should be used in the construction of the room, housing the equipment.

Manufacturers of acoustical products have, as the result of extensive research work, developed special materials and combinations of materials, the proper application of which will accomplish the desired results in the various problems of sound control. Information can be obtained from the manufacturers as to the proper materials to use and the method of their application.

Mechanical Vibration

All mechanical equipment should be selected for quiet operation, properly aligned on anti-vibration foundations placed on solid construction, to avoid setting up vibration in the building structure.

Outlet air velocities of fans should be kept as low as is consistent with quiet operation. It is better practice to use larger fans with low discharge velocities rather than small fans handling the same volume of air at high outlet velocities, as the latter may generate troublesome air noise and may necessitate considerable expense for sound control treatment.

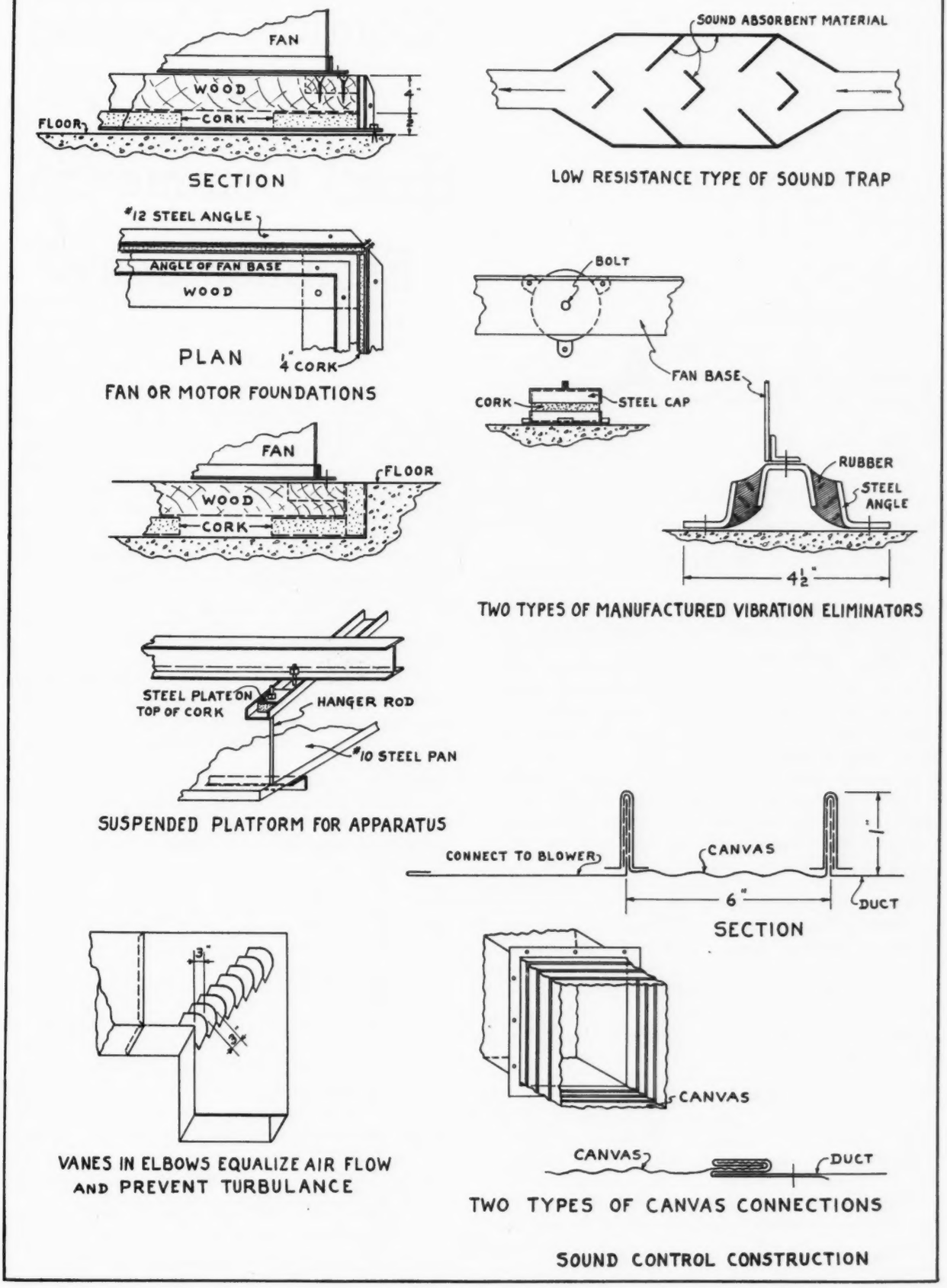
Anti-vibration foundations should be designed so that direct contact from the machine to the building construction is avoided. Various designs of foundations that will give satisfactory results are illustrated.

Anti-vibration foundations which have been constructed with the vibration absorbent material (generally cork 2″ to 3″ thick), in a continuous piece, instead of spacing sections of cork, approximately 8″ or 10″ along the bottom, may not prove satisfactory, due to the natural frequency of the mass of the machine on the cork, synchronizing with the fundamental frequency of the vibration of the machine, in which case the isolation cork will accentuate rather than diminish the vibration communicated to the foundation and floor. It is therefore apparent that the cork sections should be spaced to avoid any possibility of this occurring.

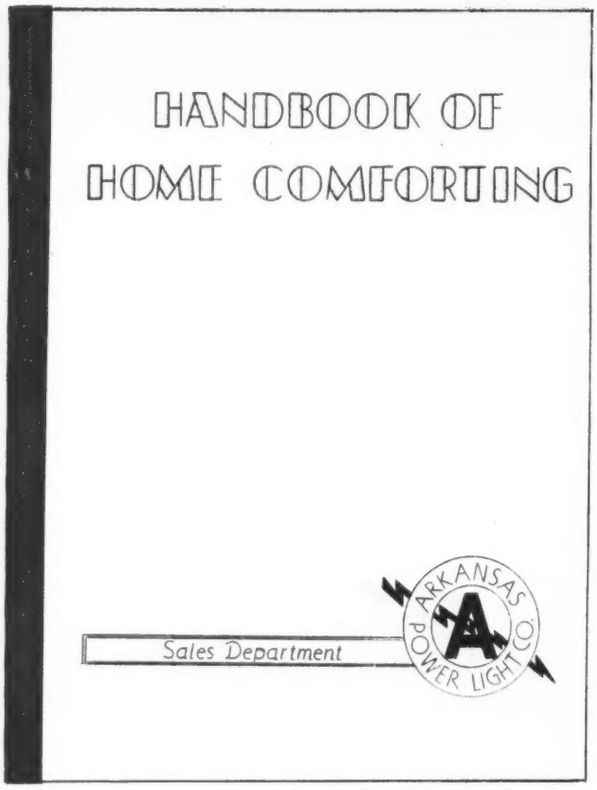
Canvas Connections

Canvas connections approximately six inches long between the duct and fan at both intake and discharge, are essential for good isolation. These should be in-

(*Continued on page* 104)



Approved methods and accessories for eliminating sound and vibration caused by machinery, or air noise due to change in direction or turbulence, or vibrations set up by air pressure or air flow.



The "Handbook of Home Comforting" is a 27-page mimeographed treatise, replete with drawings, covering all angles of the sale, engineering, installation of attic ventilation systems.

Comfort Cooling for Small Commercial Establishments*

STORES, beauty shops, restaurants, small theatres and similar places that cannot afford complete air conditioning can be made more comfortable during the summer time by means of ventilation equipment.

When you are warm, your skin is moist. Blow a little hot air on that moisture and your skin feels cool, because that air has quickened the evaporation and your skin reduces its own effective temperature. Put a little warm ether or benzol in your hand. It will feel cool because ether and benzol evaporate quickly and this quickened evaporation causes the cooled sensation. That's how Mother Nature cools us off when we ride in our automobile. The air may be still and hot and your body moist with perspiration. Yet without the temperature of the air changing, your body cools off as you ride through the air because of quickened evaporation. This is Mother Nature's cooling system.

Principles of Air Cooling

By creating air circulation with fresh air and removing heat, bad air, odors and smoke, conditions are made much more pleasant and agreeable. Principles of providing adequate and effective ventilation are generally the same for all locations, following the same layout and characteristics. Successful installations must provide for heat removal and displacing of the exhausted air with cooler fresh air. The exhaust fan should be located where the hottest air gathers. Hot air accumulates at the highest place so the exhaust fan should be installed at the highest place possible. Cooler air should be brought in from a lower location so that as the hotter air is removed it is replaced by cooler air that cools the ceiling and eliminates excessive radiant heat.

Be Sure to "Survey" Needs

First, a survey of the establishment should be made. Prevalence of dust, odors, or other undesirable air conditions govern the location of air intakes. The air should be free from dust, free from odors and be as pure as possible. The exhaust should be placed so as not to bother occupants of nearby buildings. Air intakes should be located

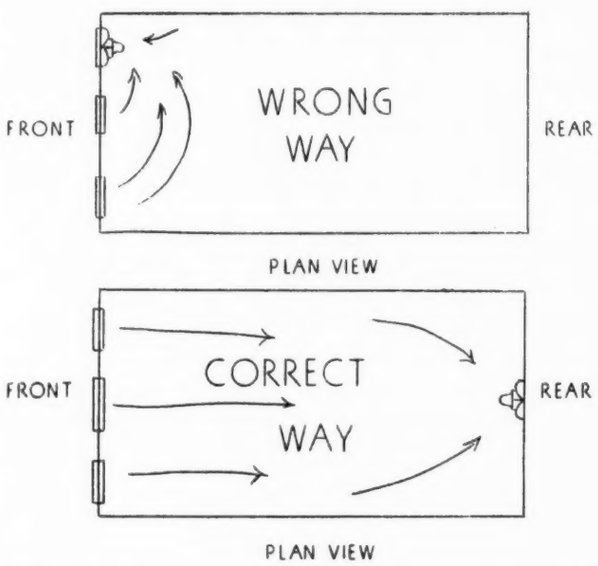


Fig. 1—Diagram showing right and wrong way to place a ventilating fan in a store where only exposures are front and rear walls.

*This material is one chapter from "Handbook of Home Comforting," published by the Sales Department of Arkansas Power & Light Co., Pine Bluff, Ark. Reprinted by permission.

away from the exhaust so there will be a circulation of air from the intake to the exhaust. Ordinarily, air intakes should be located at the front and exhausts at the rear. Night air is especially well suited for lowering temperatures, being from 10 to 15 degrees cooler than daytime air.

Air movement should always be toward the undesirable condition, not away from it. Exhaust from the highest point for heat removal. Odors or fumes should be removed where they occur. Intakes should be located where the minimum amount of heat is present, either internal or external, such as the sun produces.

Installation Practices

The first step in making an estimate for ventilating and cooling equipment is to determine the cubical content of the room or building. This is done by multiplying the length by the width by the heighth. Then divide this figure by the required air change, as shown in the table of recommended air changes below, to obtain the cubic feet per minute the fan must deliver.

Example: In a restaurant kitchen with 7,300 cubic feet content, the air, according to the table of air changes, must be changed once each half minute. Dividing 7,300 by 0.5 gives a result of 14,600 c.f.m.

Type Building	Air Change for Cooling	Air Change for Ventilating
Bakeries, Boiler Rooms, Canneries, Pressing Clubs.....	½ to 1 Min.	2 to 5 Min.
Barber Shops, Beauty Parlors, Billiard Rooms, Bowling Alleys, Garages, Factories, Restaurants, Stores, etc.	½ to 1½ Min.	3 to 6 Min.
Auditoriums, Churches, Club Rooms, Schools, Theatres, etc.	¾ to 1½ Min.	4 to 8 Min.
Homes, Apartments, Hotels, Hospitals, Offices, Banks, Undertaking Establishments, etc.	¾ to 1½ Min.	4 to 8 Min.

Always figure ample fan capacity. No user has ever been known to complain of too much air.

Selection of Type of Fan

The selection of the proper location for the fan will vary with the type of building. In small stores, barber shops and similar buildings where there are no excessive fumes or odors to be removed it is usually best to blow fresh air into the building, letting it force stagnant air out through openings at the opposite end. The blow-in job is particularly recommended if capacity is limited as it concentrates the air movement in the most needed place. Often the fan can be mounted in an existing window or transom, or an opening can be provided in an outside wall. Sometimes it is possible to mount the fan in a partition separating two rooms so that it pulls from one section and blows into the other,

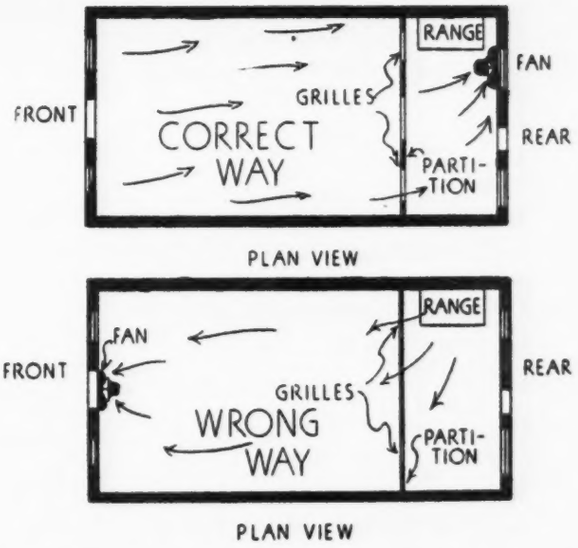


Fig. 2—Right and wrong way to ventilate a restaurant kitchen. In restaurants air should always be pulled THROUGH the kitchen or a separate kitchen fan installed. Place the fan so that air moves through ALL the kitchen, especially over heat producing units like ranges, urns, etc.

doing double duty and eliminating the necessity of hoods or louvers for weather protection.

In kitchens, laundries, paint shops, etc., requiring the removal of excessive heat, odors or fumes, the fan should exhaust air from the building. It should be located as near the source of discomfort as possible and intake openings should be provided at the opposite end of the building. (See Fig. 1)

Many large buildings, as well as some smaller ones, can be handled more effectively with fans located in penthouses on the roof to exhaust air from the building. The fans should be placed so that they discharge with the prevailing breeze. As a rule greater capacity is needed on the exhaust type of installation than on the blow-in type and it is important to use large motors. The noise factor is minimized on penthouse installations.

A cooling installation designed primarily for daytime use should be calculated on the basis of the lower limits shown in the air change table because you will not have the added advantage of cool night air.

Importance of Discernible Velocity

Remember that cooling requires velocity. Two buildings of the same size and shape may require fans of different capacities due to the different locations of the fans. Building No. 1 with a fan located in one end pulling air from the opposite end throughout the entire length of the building might be handled satisfactorily with a 1½ minute air change. Building No. 2, with a fan located in the center pulling air from both ends of the building, will require a ¾ minute air change or twice the capacity to give the same cooling effect. The air volume is the same in both cases but the velocity is greater in building No. 1, because all of the air is traveling in one direction. Fig. 3 a wide or square

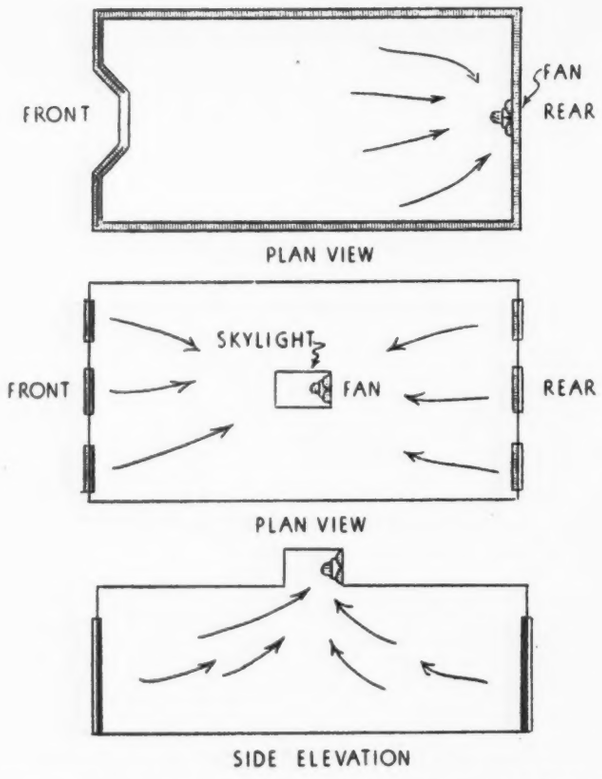


Fig. 3—Stores of all kinds, which do not have high heat producing equipment can best be cooled by pulling large volumes of air completely through the space. From end to end; from both ends to the middle are the accepted practices.

building will require a more rapid air change than a long narrow building of the same cubical content.

When a grille or louver is used it should have a net free air passage area at least as large as the area of the fan wheel. If quiet operation is desired the free area should be enough larger than the fan to assure a grille velocity of not more than nine hundred feet per minute and for a very quiet operation seven hundred fifty feet per minute. The formula "Grille area equals Fan c.f.m. divided by Grille Velocity" will simplify the calculation of grille sizes.

When it is necessary to connect duct work to the fans, ducts should have a cross-section area equal to or larger than the area of the fan wheel. Ducts should not exceed 35 feet in length.

Net and Over All Louver Sizes

Net Louver Area Sq. Ft.	Over All Area Wood Louver Sq. Ft.	Over All Area Metal Louver Sq. Ft.	Add to Over All Area if Louver Covered with ½-in. Mesh Wire	Add to Over All Area if Louver Screened
5	9	7	1	3
7	12	10	2	4
10	17	14	2	6
13	22	18	3	8
18	30	24	4	12
21	35	28	4	14
26	44	35	6	17

Note: Louver area above is based on fans with smallest motor listed. Louvers should be increased for fans with larger motors.

Suggested Prospects

Ventilation covers the whole field of industrial and commercial applications. There is hardly a business house of any description that has not some

(Continued on page 102)

Cooling Ringling Bros. Circus Tent

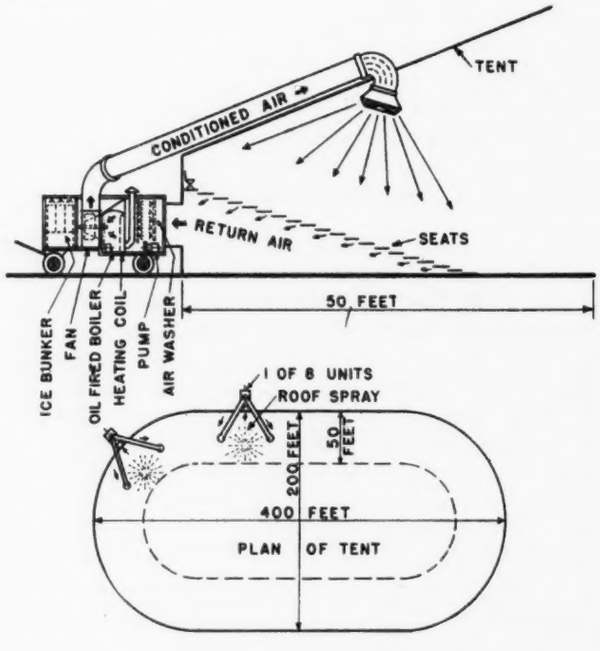
THERE'S a new thrill in store for devotees of that great American Institution, — the Circus! Ringling Brothers and Barnum and Bailey Circus have just closed a contract for comfort cooling for the big tent.

It is believed that this is the first time that air conditioning has been applied to a tent—certainly the first time to a tent this size. Eight complete sets of equipment will be required, each to be mounted on a trailer truck. Through sixteen huge diffusers, cooled air will be discharged into the tent.

Exhaust facilities will permit withdrawal of approximately the same amount of air, so that a constant supply of cooled air will be provided.

The equipment carried on each of the eight large trailers consists of a fan and special air washer with ice compartments and heating coils. Two circulating pumps will spray cold water, obtained with melting of tons of ice per hour, into the air washer through which the air to be cooled will circulate.

In chilly weather, an oil-fired boiler will provide steam for heating coils which will permit raising the temperature in the tent. The conditioning apparatus was furnished and constructed by the Buffalo Forge Co.



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SHEET METAL SECTION

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Why are Parker-Kalon Sheet Metal Screws so dependable? The answer is that Parker-Kalon originated, developed and perfected the Self-tapping Screw. Twenty-five years of manufacturing these Screws have resulted in experience, production equipment and processes, and laboratory facilities for controlling and maintaining the famed Parker-Kalon Quality, without parallel in the industry. Small wonder more than 40,000 sheet metal shops insist on genuine Parker-Kalon Screws. Parker-Kalon Corporation, 200 Varick Street, New York, N. Y.

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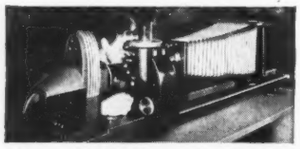
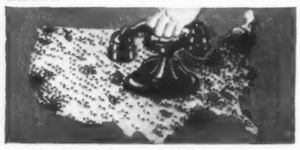
4 Reasons Why YOU CAN DEPEND ON PARKER-KALON PRODUCTS



Unexcelled Laboratory Facilities . . . The Parker-Kalon Laboratory which controls and maintains the high standard of quality for which Parker-Kalon Screws are so widely recognized, represents an investment of over $250,000.

Specialized Production Equipment . . . (including the Parker-Kalon Hardening furnaces illustrated) is required to produce Parker-Kalon Self-tapping Screws and to maintain their uniformly high quality. The Parker-Kalon plant is famed as the most up-to-the-minute plant in the industry, with a capacity of 8,000,000 Screws per day.

Free Engineering Service . . . To assist designers and production men in obtaining better fastenings at lower cost, Parker-Kalon Assembly Engineers are available throughout the country. Their services are free to users of Parker-Kalon Self-tapping Screws as well as to those who wish to investigate the time-and-labor-saving possibilities of these Screws.



Available Everywhere . . . No matter where your plant is located there is a reputable supply house distributing Parker-Kalon Screws . . . assuring you of a dependable source of supply.

Ventilation System for Below-Roof, Pent Rooms, in "G-Men's" Building

By Lawrence E. Gichner,
Gichner, Inc., Washington, D. C.

G-MEN in a hurry don't like to be stopped by stalled elevators. On the assignment of a murder, embezzlement, or kidnapping, speed is essential. But in the new Department of Justice building in Washington the G-Men were delayed because the elevator motors and generators were located in eight enclosed, unventilated penthouses in a hot attic, causing equipment shut downs while elevator repair men were kept eternally jumping.

The solution, like some of the G-Men mystery cases, was not simple. In ordinary conditions, a hole would have been knocked through the roof and either a louvred base skylight, a ventilator or a fan housing would have been installed. But this was no ordinary condition.

Thousands of visitors daily look out of the 555 feet high Washington Monument on the clean, white Capitol city of green trees and marble buildings. Their view of the tiled roofed government buildings must not be marred by unsightly, roof tops. Tops of buildings must be as smooth as the rolling lawns below.

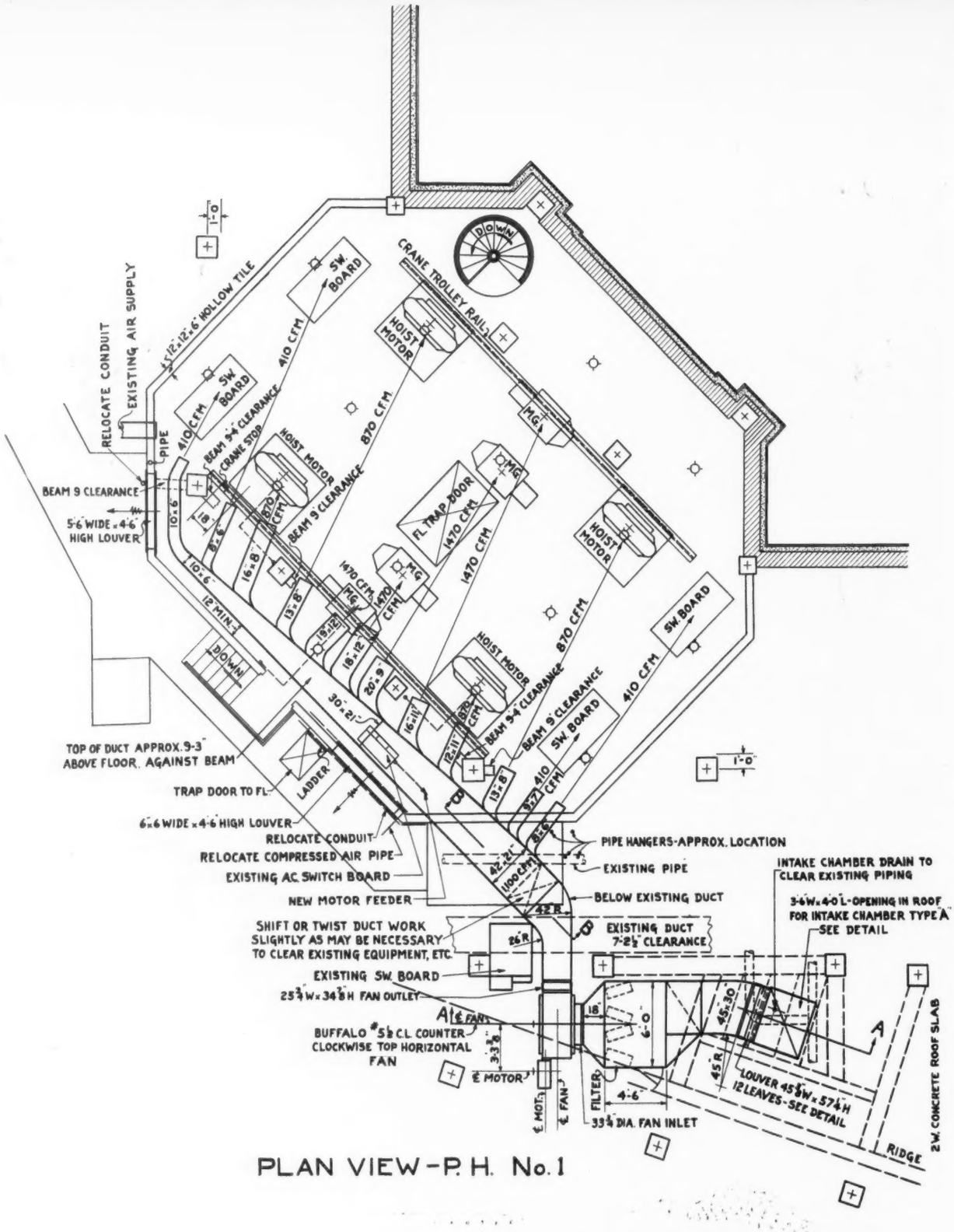
Roger H. Gates, formerly with the Department of Interior, National Park Service, was given the task of finding a solution. Limited space, obstructing beams, and protruding pipes were a few of the obstacles to hurdle. But time, calculations and an idea resulted in a unique installation that adds data to ventilating history.

Cut through the tile Gates did, but in such a neat way that even the G-Men who have regular gym classes on the roof have to look carefully to discern the intakes. Instead of pent houses, pent rooms below the roof level were devised. See sketches.

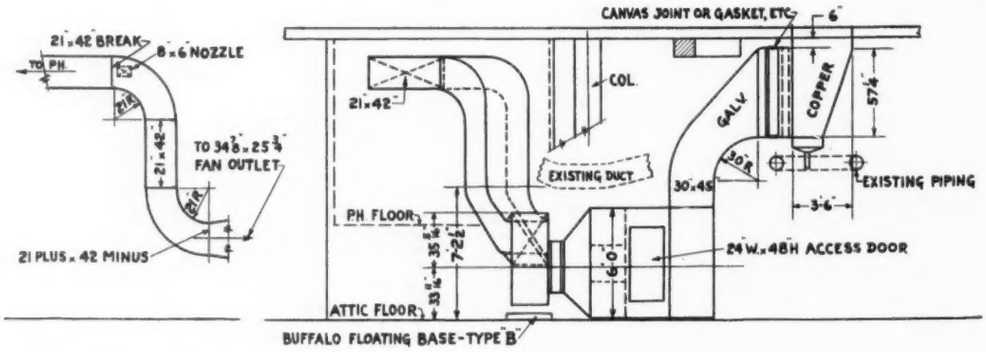
Gichner Inc. Washington sheet metal and roofing contractor was awarded the contract to develop ideas into actuality. Huge, heavy copper tanks were dropped through the roof with a louvred air inlet on one side and a rain drain outlet in the bottom. The drains were connected to the plumbing system. From each tank, a duct ran to filter housing, fan, and an intricate system of discharge nozzles. Each nozzle was focused on either a motor, motor-generator set or switchboard directing large quantities of air over strategic surfaces to effectively dissipate the heat produced by each. Some of these objects were as far away as thirty feet.

The connections of the fan housing to ducts and casings and ducts to intake chambers were made by means of an 8-ounce cotton-duck joint 6 inches wide and riveted to metal draw bands. The cotton duct was not painted. It has been found that painting stiffens and hardens the fabric, thus allowing vibrations and defeating the purpose of its intent.

Each fan is of sufficient capacity to deliver the following respective quantities of air:



PLAN VIEW - P. H. No. 1



DETAIL B-B

DETAIL A-A

Penthouse No. 1.....11,000 cubic feet per minute
Penthouse No. 2..... 6,700 cubic feet per minute
Penthouse No. 3.....11,000 cubic feet per minute
Penthouse No. 4..... 5,700 cubic feet per minute
Penthouse No. 5..... 5,700 cubic feet per minute
Penthouse No. 6..... 3,100 cubic feet per minute
Penthouse No. 7..... 5,700 cubic feet per minute
Penthouse No. 9..... 6,700 cubic feet per minute

Air Filter Housing

Air filters are of an interchangeable type having a renewable filtering medium. Each unit had a substantial frame constructed entirely of metal and so designed that a multiple installation of units is readily formed.

The filter units were so installed that the filtering medium can be readily accessible for removal and replacement through an access door of ample size. The air filter installation for each penthouse is so designed and sized that the volume of the air passing through each of the units does not exceed 250 cubic feet per minute per square foot of face area. This makes the filter housings considerably larger than the duct.

The filtering medium consists of a continuous sheet of material which is so arranged that it can be removed or equally replaced. The air-filters were located on the suction side of the fans.

Directional Flow Nozzles

Each air-supply nozzle is so installed and directed that the air strikes both the horizontal and vertical centerlines of each hoist motor and each motor-generator set and effectively sweeps the maximum feasible portion of the rear of each switchboard. Each nozzle rises above, drops below, or is run between beams, crane rails and switchboards so as to direct the air downward properly and in a manner that permits the extreme end of the nozzle to be straight and rectangular throughout a length equal to not less than its respective duct width, but also twice its duct width wherever possible.

In many cases the nozzles are so constructed as not to interfere with the normal use of existing traveling crane, and yet work efficiently.

Copper Intake Chambers

A completely non-ferrous intake chamber was installed for each ventilating system. Each intake chamber was located in the flat portion of the roof and is so constructed that the velocity of the air does not exceed 1000 feet per minute through the grille, and louver of the chamber.

The chamber is constructed of 20 gauge and 36 ounce copper properly riveted to a substantial framework of brass angles. The air outlet from each chamber is protected by a copper louver for the purpose of minimizing the introduction of rain water into the ductwork. The air inlet to each chamber is protected by a brass grating.

The air velocity through all duct work on the pressure side of the fan does not exceed 1800 feet per minute. The air velocity on the suction side of each fan, but not including the intake chamber, does not exceed 1200 feet per minute.

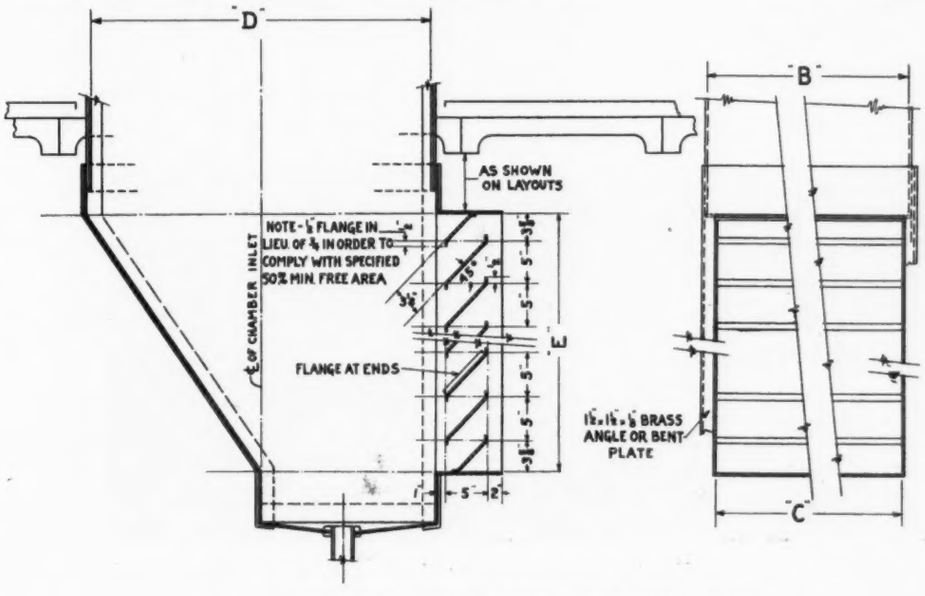
All panels comprising the duct work were "cross-broken" for rigidity.

A suitable, substantially constructed, manually-operated damper with a locking device was installed in each air supply nozzle for the purpose of balancing the air-distribution.

Louvres and Shutters

Shutter type exhaust louvers or fire dampers were installed to provide relief from the room and to prevent the spread of fire into the surrounding attic space. Each louver is held open by a fusible link which is designed to break at from 160 to 165 degrees Fahrenheit. The fusible link is located within the penthouse. Each louver is installed

(*Continued on page* 86)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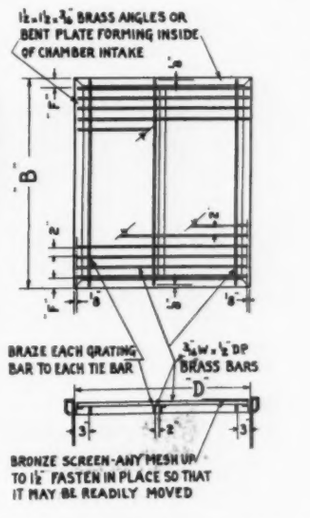
1½×1½×⅜ BRASS ANGLES OR BENT PLATE FORMING INSIDE OF CHAMBER INTAKE
B
BRAZE EACH GRATING BAR TO EACH TIE BAR
¾W×⅛ DP BRASS BARS
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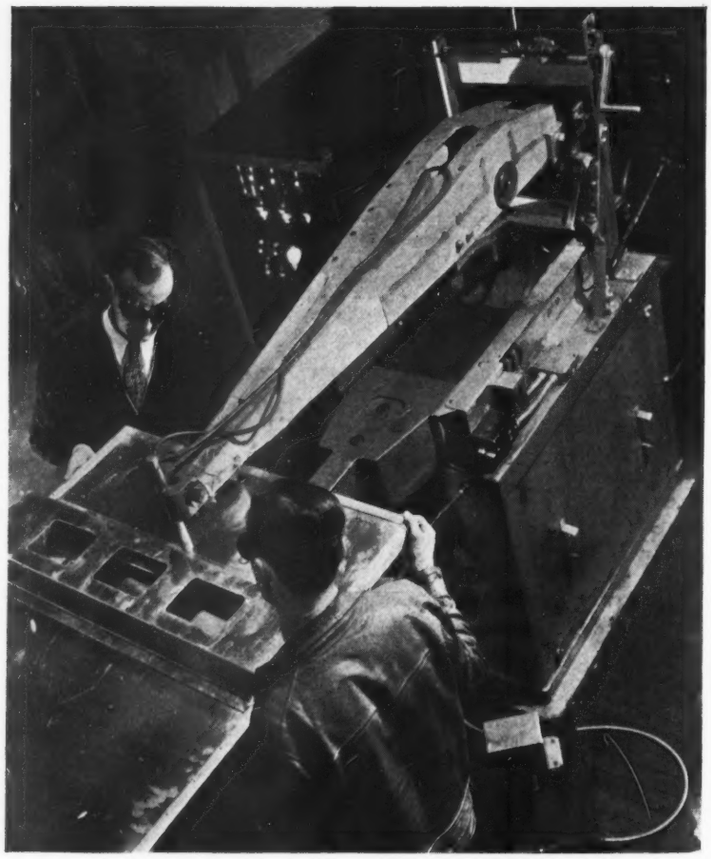
BRONZE SCREEN-ANY MESH UP TO 1½ FASTEN IN PLACE SO THAT IT MAY BE READILY MOVED

GRATING FOR INTAKE CHAMBERS



Electric Resistance Welding of Aluminum Alloys

By G. S. Bernard, Jr.
Aluminum Company of America

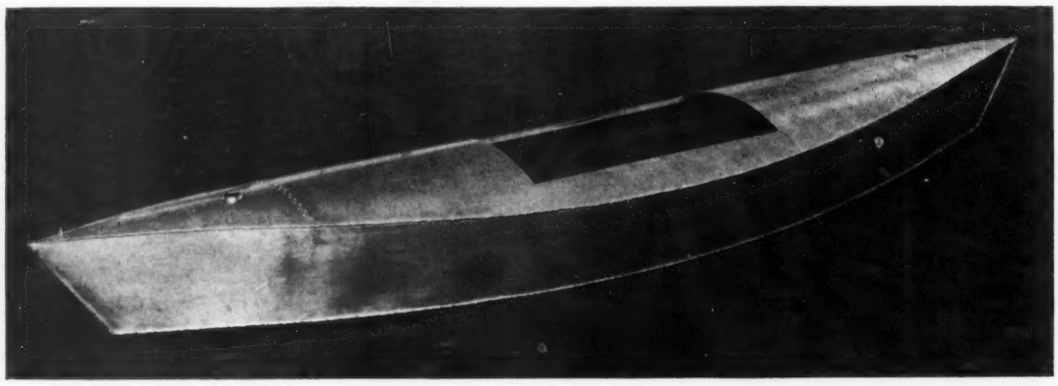
IN recent years, electric resistance welding has become an important process for joining aluminum and aluminum alloys. Its three forms—spot, seam and butt welding—have all found important applications in replacing mechanical joining because when judiciously applied they offer the advantages of reduced cost, higher production and an improved product.

Essentially, resistance welding consists of passing an electric current through two overlapping parts held together by electrodes under pressure. The electrical resistance of the metal causes rapid heating and the formation of a small pool of molten metal which solidifies to form a bond between the parts being joined.

Aviation has been one of the first industries to adopt resistance welding for joining aluminum alloys, mainly because it provides a smooth surface for interior furnishings and parts in the air stream and gives a reliable, leakproof joint for fuel tanks and other containers. It costs less than riveting if the joints are readily accessible and the work is delivered to the welding machine in sufficient quantities. When proper arrangement and spacing are employed, resistance-welded joints are equal in efficiency to riveted joints. Since aluminum itself is widely used in many different industries, it is fabricated by means of resistance welding in a diversified list of applications. In sheet-metal work, there are more opportunities for utilizing resistance welding than have been realized at present.

Spot Welding

Spot welding consists in the production of intermittent spots of molten metal which solidify and intimately bond the parts being welded. It is the most common of the three forms of resistance welding. In the following discussion, it will be used to illustrate the surface preparation and precautions to take in using these modern joining methods.



Kayak, or duck boat, assembled by welding. The bulkheads are spot-welded, while torch welding is used for the other joints. Above—Spot-welding axle support to a truck bottom. The material is aluminum alloy 3S-½H. Note that the electrode tips are water-cooled.

TABLE I

TYPICAL MECHANICAL PROPERTIES OF WROUGHT ALUMINUM ALLOYS USED IN SHEET METAL WORK

Alloy and temper	TENSION: Yield strength (set, 0.2%), lb./sq. in.	TENSION: Ultimate strength, lb./sq. in.	TENSION: Elongation, per cent in 2 inches	HARDNESS: Brinell, 500-kg. 10-mm. ball	SHEAR: Shearing strength, lb./sq. in.
2S-O	5,000	13,000	35	23	9,500
2S-½H	14,000	17,000	9	32	11,000
2S-H	21,000	24,000	5	44	13,000
3S-O	6,000	16,000	30	28	11,000
3S-½H	18,000	21,000	8	40	14,000
3S-H	25,000	29,000	4	55	16,000
52S-O	14,000	29,000	25	45	18,000
52S-¼H	26,000	34,000	12	62	20,000
52S-½H	29,000	37,000	10	67	21,000
52S-¾H	34,000	39,000	8	74	23,000
52S-H	36,000	41,000	7	85	24,000
53S-O	7,000	16,000	25	26	11,000
53S-W	20,000	33,000	22	65	20,000
53S-T	33,000	39,000	14	80	24,000

Obtaining satisfactory spot welds in the aluminum alloys depends on proper control of all the different factors involved. It is important therefore, that the operator be experienced in this type of work. Once the equipment has been installed in the correct manner and the machine settings determined, however, the process is relatively simple.

Important to the success of spot welding is the type and condition of the material being welded. The final strength of the weld depends, not only on the particular alloy and temper used, but also on its thickness and surface condition.

The aluminum alloys used in sheet-metal work lend themselves readily to fabrication by spot welding. Much of the sheet-metal work employs alloys of the unheat-treated type which owe their higher mechanical properties solely to cold working and the alloying elements that they contain. Addition of these alloying elements to aluminum affects to some extent its spot-welding characteristics, as will be seen from Table II.

A 630-kva. spot-welder in operation in the job shop of the New Kensington plant of Aluminum Company of America.

The commercially pure metal, known as 2S, contains not to exceed one per cent of other elements as impurities, principally iron and silicon. Higher tensile strengths in both welds and parent material can be obtained in alloy 3S, which contains 1.2 per cent manganese as the added alloying agent. A third unheat-treated alloy, 52S, containing 2.5 per cent magnesium and a small amount of chromium, is also widely used for resistance welding because it combines good strength with its welding qualities. For typical mechanical properties, see Table I.

A heat-treated alloy, 53S, containing silicon, magnesium and chromium, is also used in sheet-metal work, especially in the naval and architectural fields.

Removing Oxide Film

All aluminum alloys are covered with a thin oxide coating which varies with the alloy and the temper. Since this coating has a higher electrical resistance than the alloy itself, it will result in undesirable heating at the surfaces if allowed to remain during welding, and therefore should be removed or reduced to a minimum.

All the alloys except 2S and 3S generally, though not always, require some surface cleaning of the area which is to be contacted by the welding tips. In the case of parts which have been heat treated in a nitrate bath, it is also desirable to clean one or both of the contacting surfaces.

The oxide film may be removed either mechanically or chemically. Where the number of parts is small, it is probably more conveniently done by means of a fine grade of abrasive cloth, steel wool or scratch brush. For regular production, a hydrofluoric acid etching solution affords a convenient method of surface preparation. The solution, consisting of 3 pounds of gum tragacanth, 10 gallons hot water and 10 pounds of 30 per cent hydrofluoric acid, is applied to the sheet and

TABLE II

MACHINE SETTINGS FOR SPOT WELDING ALUMINUM ALLOYS*

B&S No.	Gauge, inches	Time, cycles	Welding current in amperes for alloys welded: 2S-O to 2S-H	3S-¼H to 3S-H	52S 53S-W 53S-T	Alclad 24S-T	Electrode pressure, pounds: Min.	Max.
26	0.016	4	15,000	14,000	13,500	14,500	200	350
24	0.020	6	16,000	15,000	15,000	16,000	250	400
22	0.025	6	17,500	16,000	16,000	17,500	300	450
20	0.032	8	19,000	18,000	18,000	19,000	350	500
18	0.040	8	21,000	19,500	19,500	21,000	425	600
16	0.051	10	23,000	22,000	22,000	23,000	525	700
14	0.064	10	26,000	24,500	24,500	26,000	600	800
12	0.081	12	29,000	27,000	27,500	29,000	700	900
10	0.102	12	32,500	30,000	31,000	32,000	800	1050
8	0.128	15	36,000	33,000	34,000	35,000	900	1200

*Electrode tip was ⅝ inch in diameter; machined at a 7-degree angle for all gauges except B&S No. 8, which was machined at 11 degrees.

allowed to remain for a short time, which varies with the thickness of the oxide film. It is thoroughly washed off.

Care must be exercised in handling the solution because of the harmful burns which may be produced by hydrofluoric acid. Complete directions for the use of this etching solution, together with precautions to take while handling it, are given in the booklet "Welding Aluminum."*

The machine settings for making welds in the aluminum alloys depend on the thickness of the material to be welded (Table II). By proper control of the welding current, the time the electric power is on and the pressure on the electrodes, consistent weld strengths are obtained in material as thick as ⅛ inch.

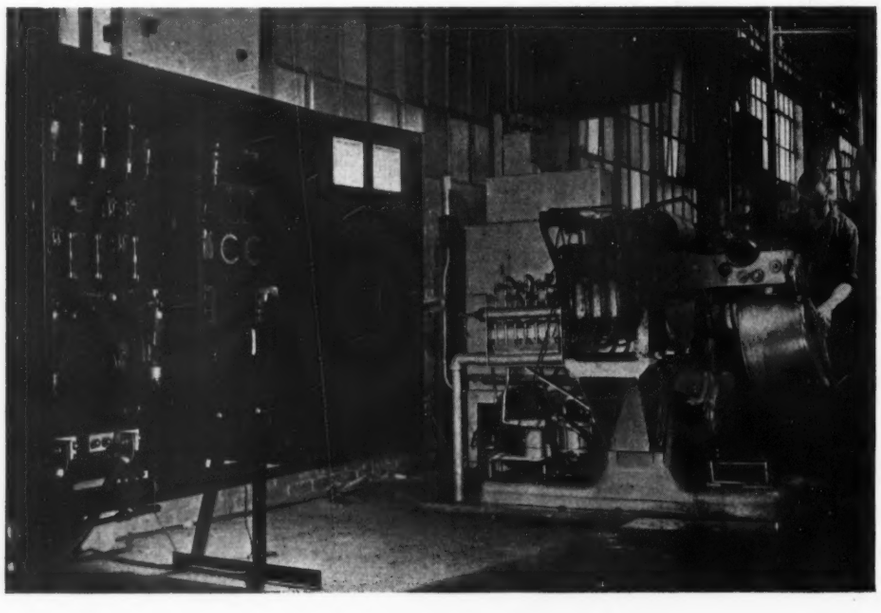
While the values in the tables are based on numerous tests and considerable production experience, trial spot welding is nevertheless recommended before beginning a production job. The trial specimens serve as a check on the dependability of joints made using the proposed machine settings. Such trials are made on material which duplicates in every way—including thickness, alloy, temper and surface preparation—the material to be used in the actual job. In choosing the equipment for a particular job, both the thickness of the material being welded and the shape and dimensions of the finished assembly are factors for consideration. Some industries, notably those producing aircraft and refrigerators, have developed modified equipment especially adapted to their fabricating operations.

Experiments* on spot welding aluminum have resulted in data which serve as a better basis for the design of spot-welded joints. They have increased our understanding of the effect of such factors as current intensity, time of application of the current and electrode pressure.

Most important of the factors affecting the strength of spot welds is the welding current. In Table II are given approximate values which have given strong spot welds with good appearance. The use of a higher welding current increases the weld strength at the expense of appearance. On the other hand, appearance may be improved by the use of lower values of current, but this is not recommended because the strength may be affected adversely.

*Furnished on request by Aluminum Company of America.

**"The Effect of Current, Pressure and Time on the Shear Strength and Structure of Spot Welds in the Aluminum Alloys," by G. O. Hoglund and G. S. Bernard, Jr., *The Welding Journal*, November, 1938.



Seam welding a "pie tub" for use in large-scale cookery

While the welding current is the most important factor, it is also necessary to control the time of current application and the electrode pressure if consistent results are to be obtained. The timing equipment, which controls the application of the electric power, is a vital part of the spot-welding setup. For the highest quality work, it is necessary to have synchronous control equipment, usually of the electronic type. It applies power to the welding machine at a pre-set point on the voltage wave and eliminates undesirable transient currents.

Another factor in securing satisfactory welds is the electrode tip. An ideal tip has hardness, high conductivity and a shape which gives a point contact. Tips are usually made from a hard copper alloy which, unlike many of the common alloys, has a high electrical conductivity.

Generally, two conical electrodes, machined at an angle of from 7 to 12 degrees, are used. While at least one electrode must be conical or spherical, one flat electrode may be used to prevent indentation of the tip on surfaces where appearance is especially important.

In order to aid in maintaining the correct shape of the tip, water cooling is employed. Such cooling prevents annealing of the copper tip and minimizes the tendency for the aluminum to alloy with the copper surfaces. Nevertheless, "pickup" will occur and should be removed after 20 to 30 welds. Use of a fine emery cloth is recommended for this purpose since it is essential that the contour of the tip remain unchanged.

Seam Welding

Seam welding is much like spot welding, except that the spots overlap to form a continuous seam. This result is achieved by substituting rollers for the pointed electrodes and properly timing the current applications.

The electrode rollers, made from the same copper alloy which is used for spot-welding electrodes, are supplied in a wide range of sizes. The roller has a curved or V-shaped contour, the radius of curvature or angularity being similar to that of the spot-welding tips. By means of a suitable mechanism, a constant pressure is maintained between the rolls, one of which is motor-driven, the other an idler.

Although non-synchronous timing is often permissible in the case of spot welding, synchronous timing is essential for seam welding. By its use, a uniform overlap is secured and continuous operation of the welding machine assured.

The same care in surface cleaning that is necessary for spot welding is also essential for successful seam welding. Likewise, the current and pressure must be carefully regulated. In order to get satisfactory results, the percentage of the time of power application to the time "off" between welds should not exceed 25 per cent. The electrode rollers require maintenance, the same as electrode tips.

In addition to producing continuous seams, the seam welder can also operate intermittently to produce spot welds. If the machine has a suitable range of timing and roller speed adjustments, any desired spot spacing may be obtained. The speed of producing spot welds with a seam welder is faster than that obtained with a spot welder.

At the present time, seam welding is employed mainly for building gas and liquid-tight containers such as plane fuel tanks, gas tanks, etc.

Butt Welding

Resistance butt welding is of two types: (1) push welding and (2) flash welding.

Parts to be push-welded are first clamped in dies, one of which is movable, the other stationary. When pressure is applied to the movable die, the two pieces are forced together. Upon application of electric current, melting occurs at the juncture. The pressure is maintained, and some of the metal is pushed out. After the movable die has traveled a predetermined distance, the current is cut off automatically, and the molten metal between the parts solidifies to form the bond.

The push-welding process is most readily applicable where there is a mechanical fit between the parts being welded and the die design is such as to give a uniform distribution of the electric current. Round or rectangular bars are consequently more easily joined by push welding than complicated or unsymmetrical sections.

For more complicated sections, such as those commonly produced by the extrusion process, flash welding is recommended. The parts to be joined are clamped in the machine with a short gap between them. Then, the two pieces are moved closer together at a gradually increasing speed. A flashing period results, at which time the heat generated by the arc melts the metal. As the parts are brought in contact, the flashing

(*Continued on page* 86)

TABLE III

APPROXIMATE MACHINE SETTINGS FOR SEAM WELDING ALUMINUM ALLOYS

Alloy	Thickness, inch	Pressure, pounds	Cycles On	Cycles Off	Spots per inch	Approx. "On" RMS amperes
52S-½H	0.025	600	1	6½	18.0	26,000
52S-½H	0.032	680	1	6½	16.0	29,000
52S-½H	0.040	760	1	6½	14.3	32,000
52S-½H	0.051	855	1½	6	12.6	36,000
52S-½H	0.064	960	1½	6	11.3	37,500
52S-½H	0.072	1015	1½	6	10.6	39,000
52S-½H	0.081	1080	2	11½	10.0	40,000
52S-½H	0.102	1210	2	11½	9.0	42,500

For 52S-¼H—Reduce pressure 10%.
For 52S-O —Reduce pressure 25%.
For 3S½H —Reduce pressure 25%.

At left—Exterior of Panza shop on a busy thoroughfare with some of the artistic products displayed for passersby. Below—Corner of the shop with several types of lanterns and andirons in numerous metals. Note the variety of designs, from simple to ornate—all hand fabricated by this sheet metal artisan.

"1,000 Lanterns to Choose From"

By A. B. Laing, Hollywood

HOLLYWOOD! Mecca of millions; land of legendary incomes; birthplace of "isms"; incubator of pseudodox; false-fronted but beauty hungry; arena where competition asks no quarter and gives none; city where "ideas" command a premium—in such a setting Charles Panza, sheet metal worker, is building a business fabricating lanterns and artistic metal ware.

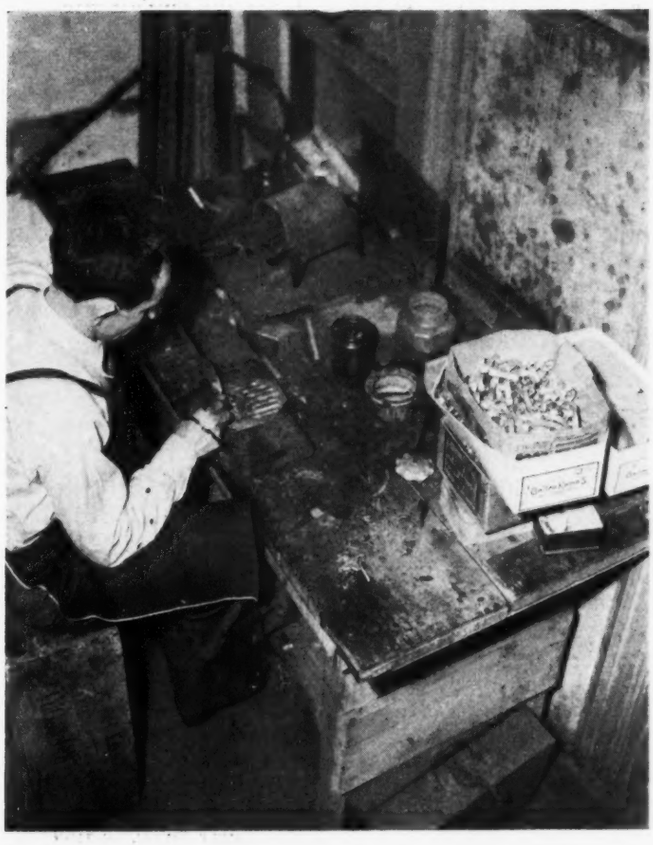
Charles Panza's slogan is "1,000 Lanterns to Choose From." Into his shop on a busy, outlying thoroughfare, flows a continuous supply of brass, copper, stainless steel, galvanized iron to be fabricated into lanterns, fire screens, andirons, candelabra of intricate design and consumate artistry.

This sheet metal worker says—"I am never idle" and little wonder, for Panza has no one to help him fabricate his specialties. A brake, drills, welding and soldering equipment and the hand tools common to any sheet metal shop constitute the production facilities of the shop. Panza does have sales help, as the pictures show, from his daughter, Noma.

Starlights, Candelabra, Lanterns

Among the items offered for sale, the galvanized iron Mexican starlights are very poplar since these little lanterns can be used inside or outdoors, for decoration or utility. Also popular are the tiny candelabra, less than 4 inches high, which Panza has patented. These candelabra are sold wholesale, f.o.b. Los Angeles. Quite a widespread business has been built up in these candelabra, selling the novelty to gift shops all over the state. The gift shops sell the candelabra for parties (mostly birthday parties), pointing out that these little ornaments aid in decoration with their brightly colored

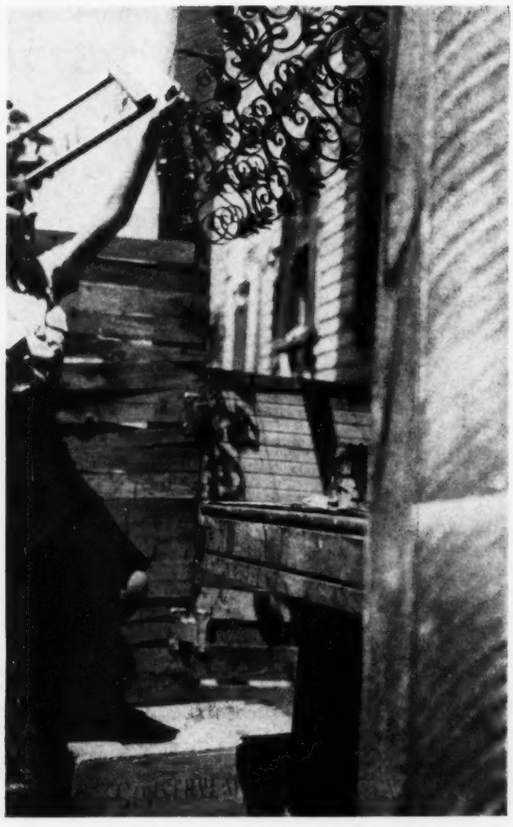
Noma Panza holds a single, miniature candelabra from a shipment being made ready, to show the intricate fabrication of the tiny parts. Below—Charles Panza is soldering pieces of a candelabra in the jig which holds an assembly. At right, below—Large lantern on an old car parked across the street to attract attention of motorists.



candles and keep dripping wax from falling onto the cloth or the cake.

These small candelabra are made from narrow strips of light galvanized iron, the strips being bent to proper shape on a brass template as one of the pictures shows. The various pieces are then soldered together and the whole is dipped in black lacquer and dried in the sun. The candelabra are made in several sizes holding from two to six tapers of the type used for Christmas tree decorations or birthday cakes.

Several types of larger outside and indoor lanterns are made up in standard patterns and mate-



At left—Noma Panza holds a large lantern formed of painted galvanized iron and glass. This lantern is popular for gate posts, patios, etc. Right—Brackets for doorbells or large candelabra are dipped in lacquer and dried in the sun to produce a popular finish.

rials as one of the shop pictures shows. Some of these larger lanterns are made of Monel metal, some of brass or copper, others of galvanized iron painted black. All parts are made up by hand with all joints soldered, while the glass panes are held in place by clips soldered onto the inside of the frame. Chains for suspended types are hand forged in Panza's shop; brackets for wall types are also made in several designs.

The picture of the rear of an automobile carrying a huge lantern and a sign pointing to the shop, illustrates a method worked out to attract the attention of traffic moving on the other side of the street. The old car is parked as shown so that cars passing across the street from the shop see the lantern and the sign and thereby have attention directed to the shop display window.

This shop display window, incidentally, is reminiscent of some old world shops wherein artisans since shops began discreetly displayed a limited number of their finer pieces. The pictures of the outside show the window and its contents.

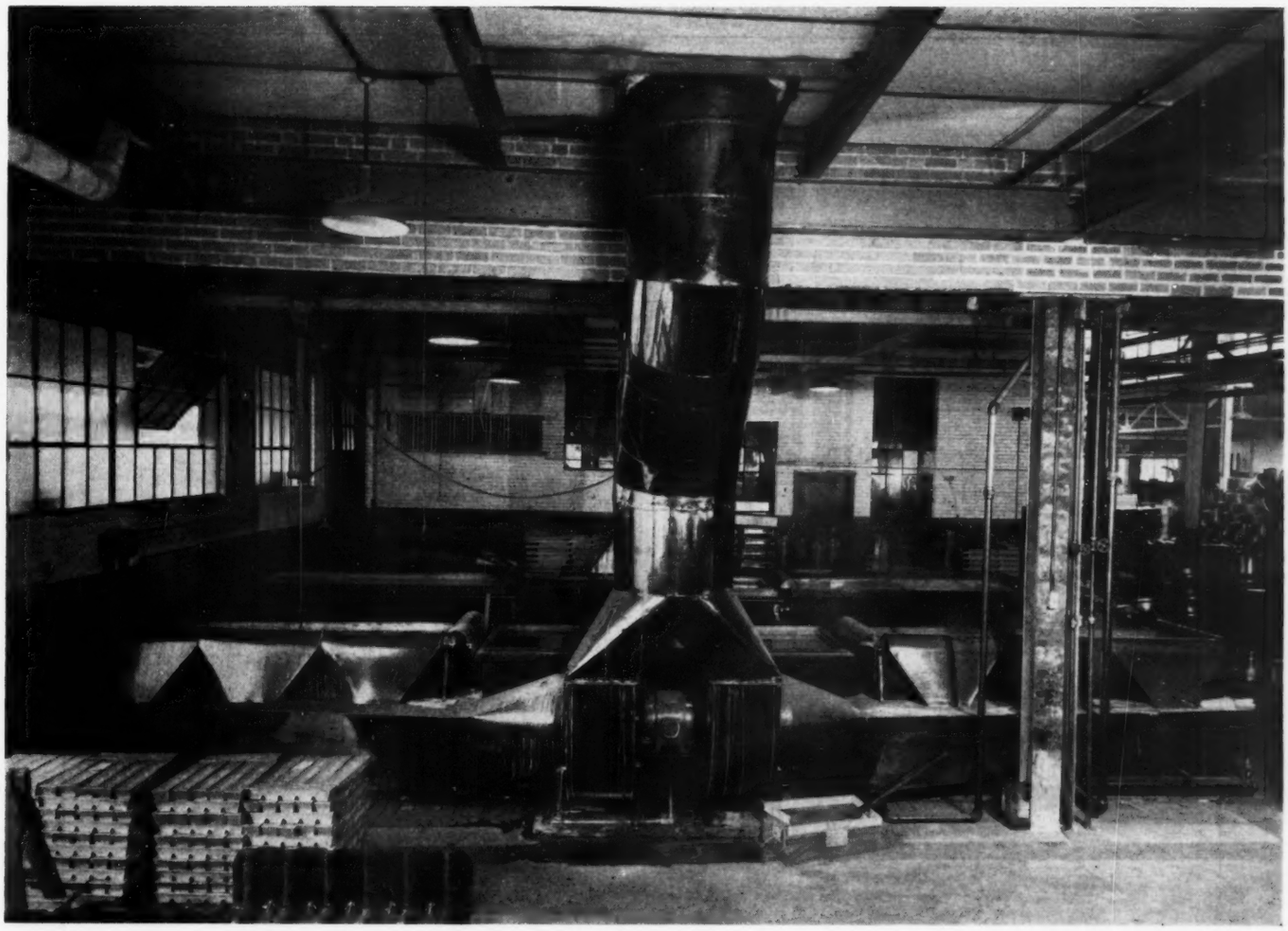
Glycerine Simplifies Spray Painting

Spray painting can be made a simpler, easier task if the areas that are to remain free of the paint are first coated with glycerine. This method obviates the need for cumbersome shields and baffles and permits finer differentiation and sharper lines. Oil-containing paints will not combine with glycerine, and the new quick drying lacquers will not penetrate the glycerine film since their vehicles are not, as a rule, soluble in glycerine. After the spray coating has dried, the glycerine film carrying the unnecessary paint is easily removed with water.

The glycerine will not affect paint already on the surface. Rather, it will lend sheen and gloss. Unpainted metal surfaces will not be affected because glycerine is neutral and will not react with them nor injure their finish.

This method of spray painting is finding wide usage in the finishing of automobile bodies and fine furniture.

—*"Glycerine Facts."*



Exhaust side of one battery of tanks showing side and end hoods and air conveying ducts, with twin blower and exhaust line. For construction details see drawings opposite.

Open-Tank, Steam Removal System

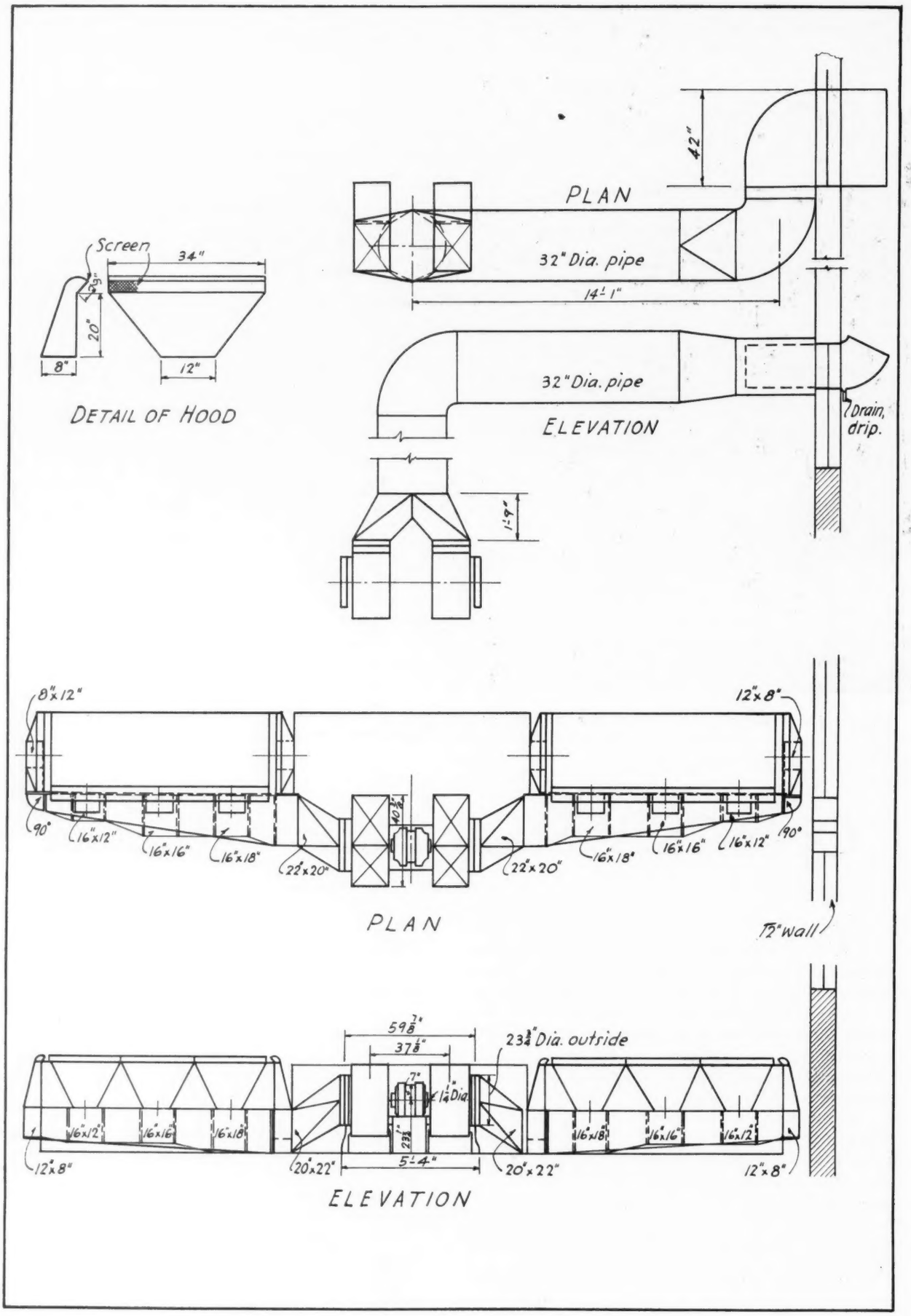
Of all the various types of fume collection systems in everyday use, that type of system which leaves the whole tank top open for immersion of objects and sucks the fumes or vapors across the liquid surface into slotted hoods at the tank edges is probably the most interesting because it usually seems the least efficient. A system of this type is shown in the drawing and in the photographs.

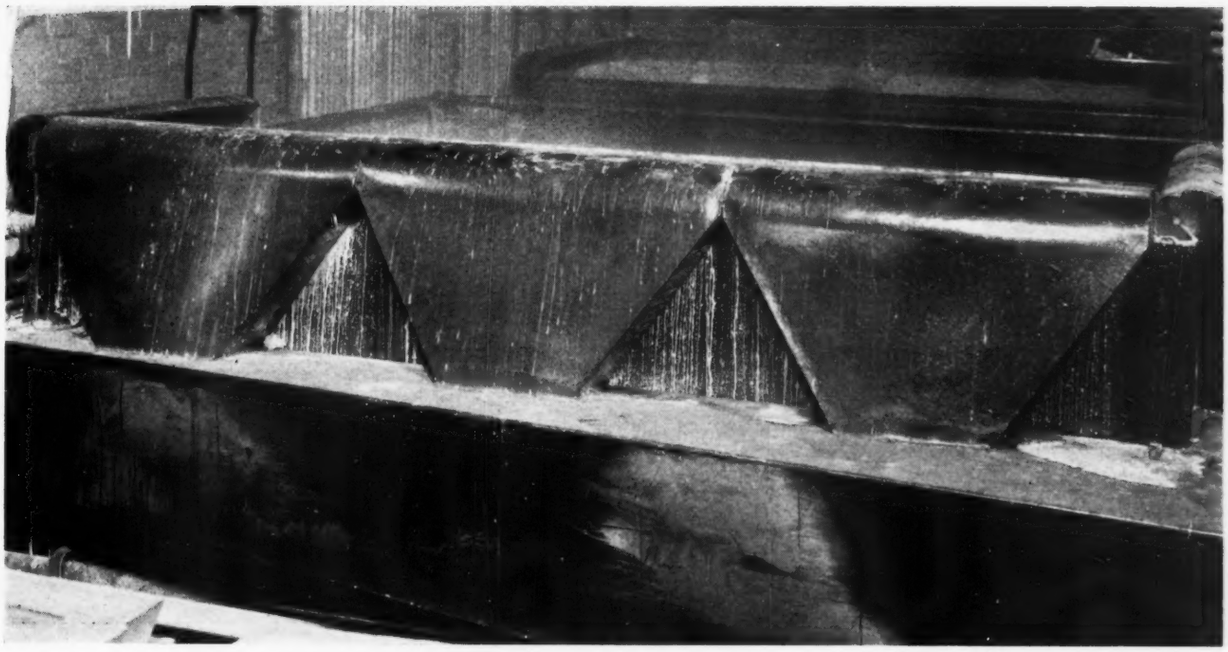
This installation was made by the Goergen-Mackwirth Company of Buffalo, N. Y., specialists in industrial ventilation and material handling, in the plant of the Jamestown Metal Products Company, Jamestown, N. Y. The purpose of the system is to remove fumes and steam from dip tanks which constitute a part of the process of Bonderizing metal surfaces.

As the photographs show, the Bonderizing tanks are located in a corner of the plant. Metal parts to be treated come from the first assembly where parts are joined by spot and tack welding. The assembly to be Bonderized must be dipped into three tanks as shown. Two tanks contain solutions heated by steam coils to a temperature of approximately 200 degrees F. The third tank (center tank in the row) is clean, unheated, water for washing.

Because the hot solution tanks are at about 200 degrees F. a large volume of fumes and steam come off the tanks. Without any venting, workmen would not be able to see the liquid surfaces and the entire interior of the plant would be filled with steam and fumes which, on cooling, would condense on all cold surfaces, including machinery and parts.

The motive head of this exhaust system is the double fan unit. The fans operate at 1150 RPM and each fan handles 4,500 cfm. As shown in the details, each slot is 3 inches by 34 inches or 102


Screen
34"
5"
20"
8"
12"
DETAIL OF HOOD
42"
PLAN
32" Dia. pipe
14'-1"
32" Dia. pipe
ELEVATION
Drain, drip.
1'-9"
8"x12"
12"x8"
90°
16"x12"
16"x16"
16"x18"
22"x20"
40½"
22"x20"
16"x18"
16"x16"
16"x12"
90°
PLAN
12" wall
59⅞"
37⅛"
23¾" Dia. outside
7"
1½" Dia
23"
16"x12"
16"x16"
16"x18"
12"x8"
20"x22"
5'-4"
20"x22"
16"x18"
16"x16"
16"x12"
12"x8"
ELEVATION



Closeup of a tank showing proportions of hoods and connection to exhaust line. Note that all seams and connections are welded, as a result of which these systems are air tight.

square inches in area. There are five hoods on each tank so the total exhaust opening is 510 square inches or 3.5+ square feet. With the fan withdrawing 4,500 cfm through 3.5 square feet of hood the velocity at the hood figures as 1,285+ feet per minute. Because the hoods roll down at the top, thereby slanting the opening toward the water surface the "pull" from the five hoods is across the tank surface.

The air exhausted by the system is replaced by infiltration and open windows. The exhaust is also sufficient to provide good ventilation in this part of the factory. The photographs were taken with all tanks in working condition and the absence of any trace of steam or fumes indicated that the system is functioning as calculated.

The Goergen-Mackwirth contract did not include construction of the twelve tanks in the department. Each tank is 36 by 108 by 40 inches in dimensions and is built of ¼-inch steel plate. All joints in the tanks are welded. The tanks were cut and formed in another shop and assembled for fit. The pieces were erected on the job and welded into final assembly by the field welders. No special technique or jigs beyond simple clamps were required. After final welding assembly the tanks were reinforced with outside stays and reinforcing shapes.

The exhaust ducts and the hoods are built of 16-gauge steel. To simplify construction and to insure an absolutely tight system all joints are welded. The pieces for the hoods and the ducts were cut as shown in the details. The hoods were welded in the Buffalo shop and welded to the duct which, in turn, was welded into one complete unit and shipped to the job.

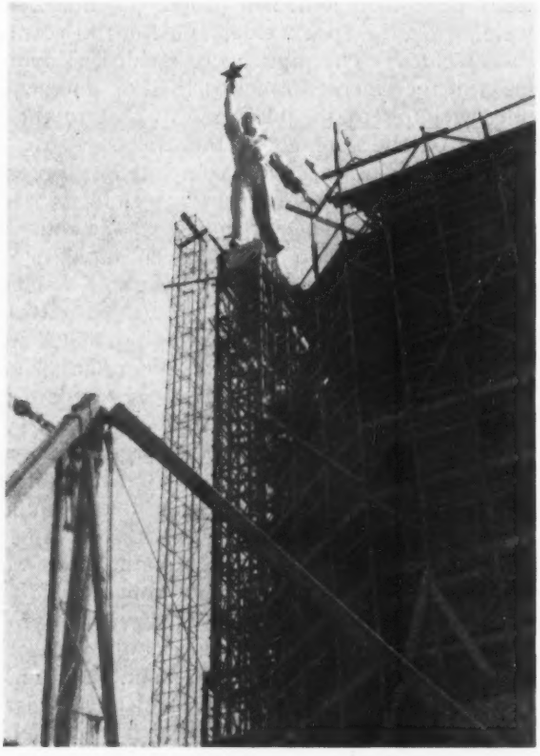
The exhaust lines from the blowers to the outdoors are constructed of rolled, 16-gauge steel. To form the sections which show in the photograph, each section was tack welded on the spot welder to hold the section to shape and the full seam was then electrically welded. Completely formed sections were then joined in proper position by tack welding on the spot welder and the full seam was then welded. The pipes were welded as complete units in the Goergen-Mackwirth shop and required only welding to the blower "Y" and to the pipe section on the floor above the tanks.

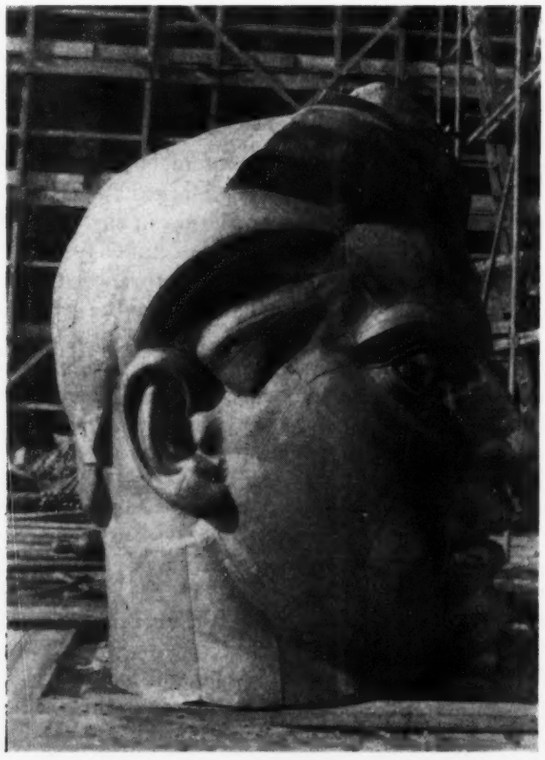
The Goergen-Mackwirth company has long advocated welding instead of lock forming wherever welding is possible. On much of the duct work fabricated in the shop for use in ventilation or material handling systems the pipe work is welded instead of locked. (An article on welded galvanized iron duct work by this firm was published in the July, 1937, American Artisan.) Where heavy gauge sheets or plates are used, welding is standard practice.

John J. Yager, president of Goergen-Mackwirth, says of welding of this type—"On work of this nature our experience has been that welding is easily adapted. By comparison with costs of fabrication and assembly for other methods of joining pieces and sections, we have found welding is cheaper and production is speeded up. To produce finished work by welding requires only a reasonable amount of inspection by a foreman. The amount of mechanic's time required is also considerably reduced.

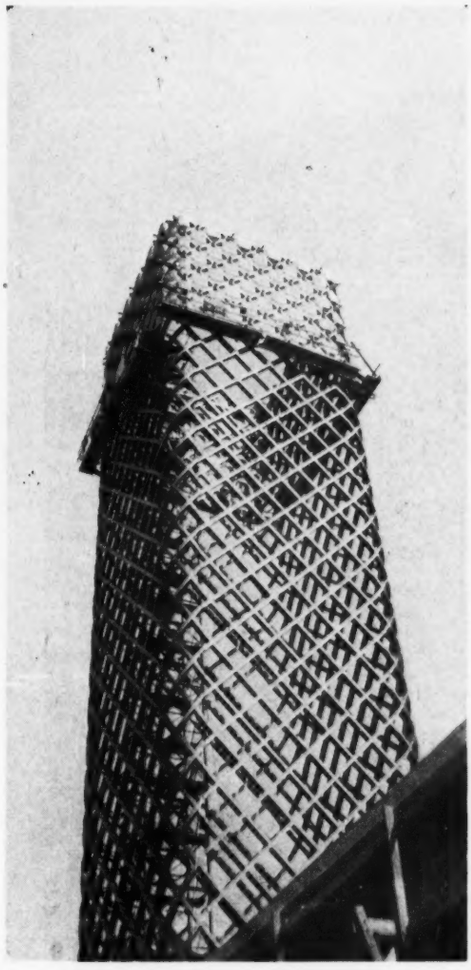
"Further, we have found that welding eliminates the use of men in gangs such as are necessary for speedy production when punching, riveting, forming, locking is used to join pieces and sections. Closer tolerances have been found possible and restricted space does not increase assembly cost as it does when a gang of men have to function."

Interesting Sheet Metal Work at New York Worlds Fair

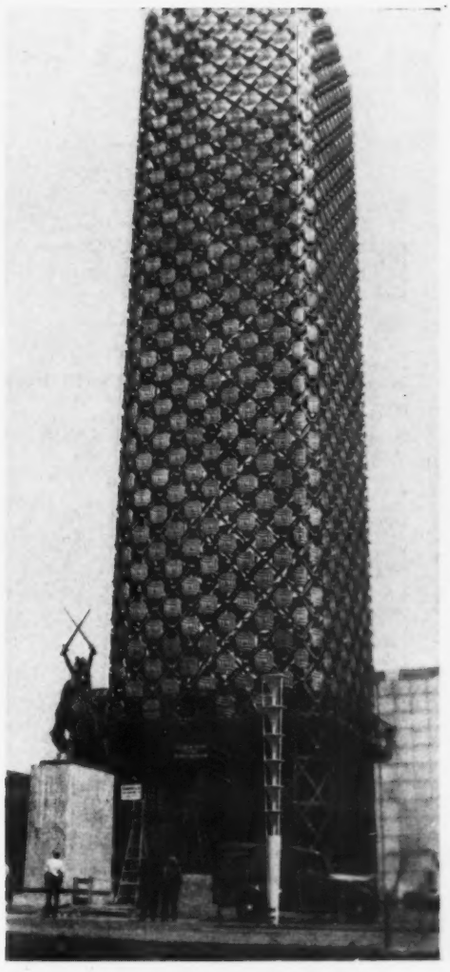




1—An outstanding example of sheet metal work is the 79-ft.-high stainless steel statue of a "Worker" that tops the Russian Soviet building. The gigantic figure, made in Russia of some 3,000 small individual sheets hammered to form over a wooden model, was shipped here to location in 12 Sections. Separate pieces of sections were joined entirely by spot welding. Sections were raised to the top of a 185-ft. structural steel pedestal, then joined by electric welding. Total weight of statue is 30 tons. The head, here shown before it was raised to position, is 9 ft. high; the stair, in Worker's hand, is 10 ft. in diameter.

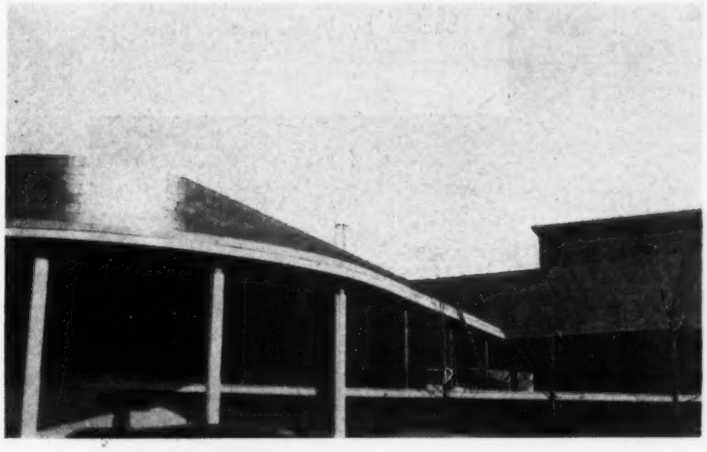


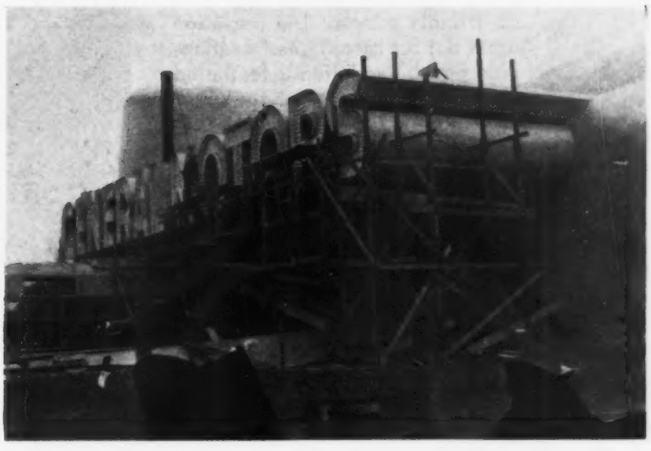
2—One of the notable structures, is the 14-ft.-high, square tower that sets off the Polish building. The understructure is heavy structural steel, which was gilded before application (by brass bolting) of 1250 Muntz Metal panels and an equal number of rosettes. Klein & Kavenaugh, New York City sheet metal contractors installed the ornaments. Miller & Doing, Brooklyn, N. Y., stamped all panels and the rosettes.

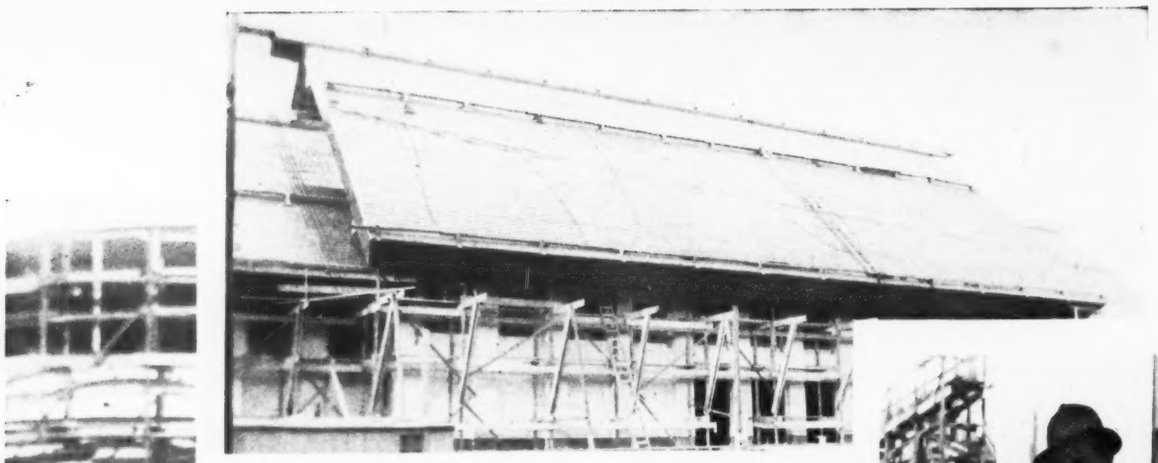


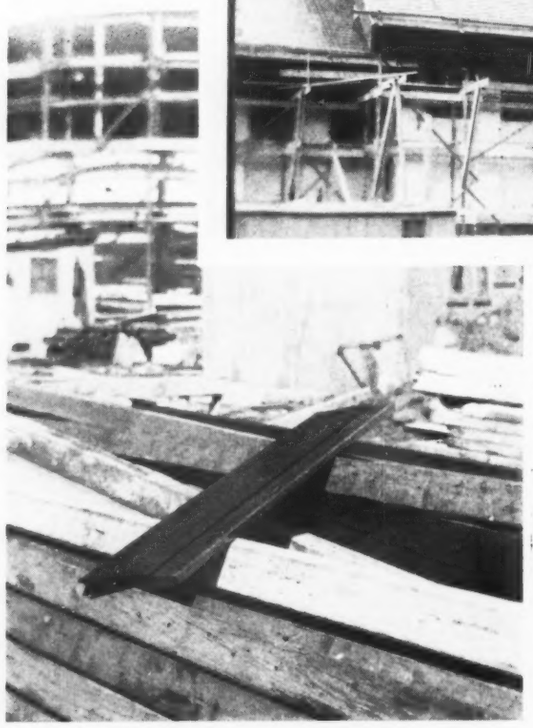
3—Below—Visitors doubtless will remember the General Electric Co. building for many reasons one of which will be that it is covered inside and out with copper panels closely joined by folded seams. The exterior copper is backed by Celotex insulation. The American Brass Co., who furnished the sheet metal, supplied some 14,000 stipled panels 15 in. by 24 in. Application was handled by E. E. Carlson, sheet metal contractor, Bronx, N. Y. City. Natural copper color predominates, but large areas are of two different shades of blue. To preserve these colors, as well as the natural color of the basic metal, a special lacquer developed by the exhibitor, was applied.

4—The picture below shows one of several galvanized sheet steel signs made and erected by Herrmann & Grace, Brooklyn, N. Y., sheet metal contractors, for the General Motors Co. exhibit building. The maximum depth of the letters in this sign shown is 40 ft.; height of letters 12 ft. "Stretcher-Level" sheets were used in all of five similar signs furnished. Internal bracing is lumber. Sheet metal seams are welded throughout. Metal used was 20-gauge; 20 tons total were required.

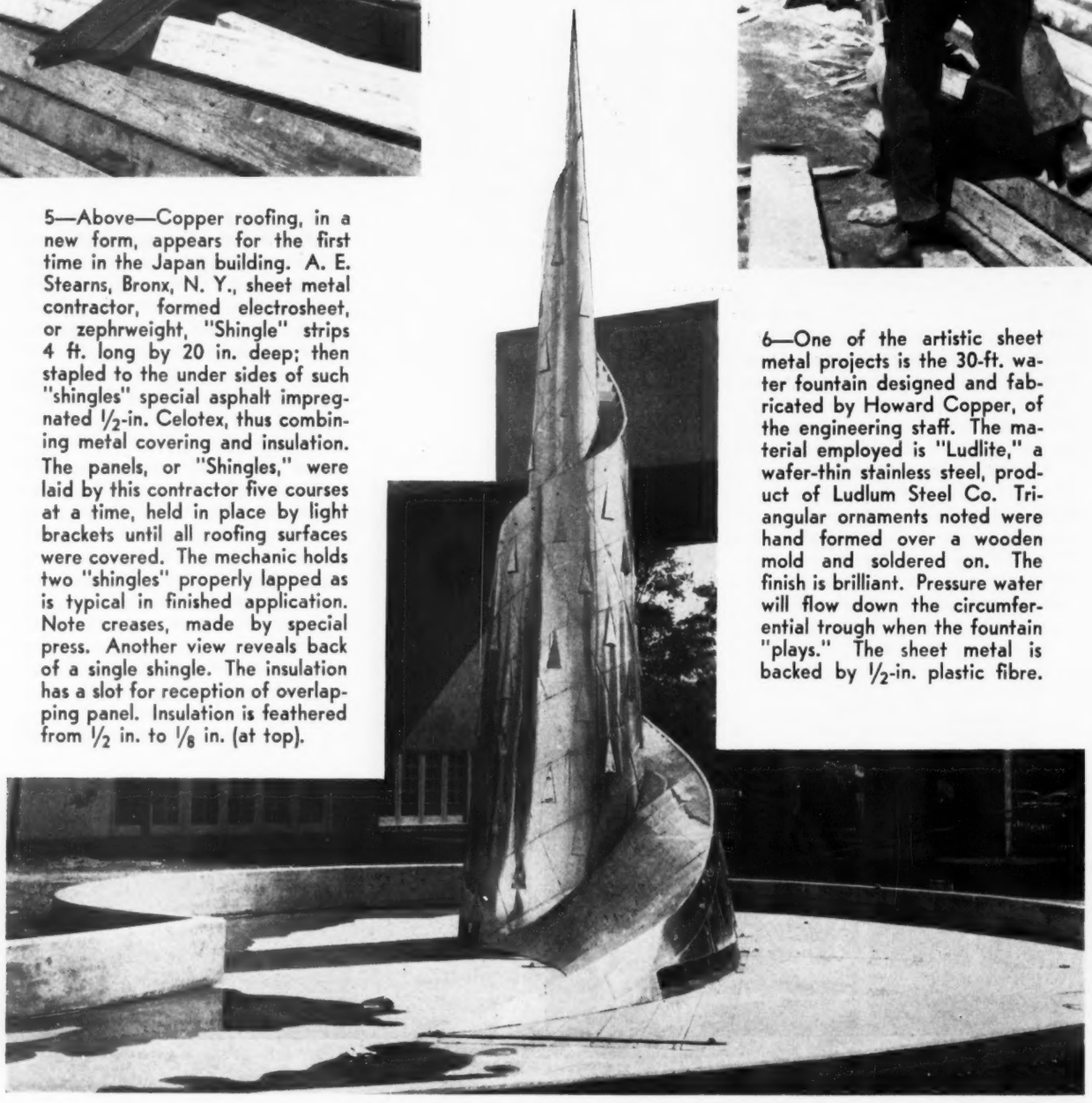








5—Above—Copper roofing, in a new form, appears for the first time in the Japan building. A. E. Stearns, Bronx, N. Y., sheet metal contractor, formed electrosheet, or zephrweight, "Shingle" strips 4 ft. long by 20 in. deep; then stapled to the under sides of such "shingles" special asphalt impregnated 1/2-in. Celotex, thus combining metal covering and insulation. The panels, or "Shingles," were laid by this contractor five courses at a time, held in place by light brackets until all roofing surfaces were covered. The mechanic holds two "shingles" properly lapped as is typical in finished application. Note creases, made by special press. Another view reveals back of a single shingle. The insulation has a slot for reception of overlapping panel. Insulation is feathered from 1/2 in. to 1/8 in. (at top).



6—One of the artistic sheet metal projects is the 30-ft. water fountain designed and fabricated by Howard Copper, of the engineering staff. The material employed is "Ludlite," a wafer-thin stainless steel, product of Ludlum Steel Co. Triangular ornaments noted were hand formed over a wooden mold and soldered on. The finish is brilliant. Pressure water will flow down the circumferential trough when the fountain "plays." The sheet metal is backed by 1/2-in. plastic fibre.

GIVE BETHLEHEM SHEETS THIS 3-MINUTE TEST ...then decide

FLEX 'EM

Flex a piece of Bethlehem galvanized sheet steel with your hands. Just feel the smooth, easy "give" to the metal: assurance of neat-looking elbows and curves and easy handling on the job.

BEND 'EM

Then slip this Bethlehem sheet into your brake. Bend it 90 degrees. Examine the condition of the coating along the knife-edge surface. It's proof of the tightness of the zinc coating: assurance of long wear on the job.

JOIN 'EM

Finally run your experimental Bethlehem sheets through the edger and peen them together. That's the final test. It's a typical joining operation. It's your assurance of quick fitting on the job.

Now decide. You've performed 3 key *sheet-metal operations.* You've spent only 3 minutes. But you have a mighty sound basis for knowing exactly what Bethlehem sheets will do.

Bethlehem Sheets are available from your distributor.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

A Keg or a Carload . . . your order receives "Scully Service"

ALLOYS
ANGLES, HOT ROLLED and COLD ROLLED
ARCHES (CORRUGATED)
BABBITT
BANDS and HOOPS
BARS, HOT ROLLED
ALLOYS (HR and CF)
COLD FINISHED
ELECTRIC HIGH CARBON STEEL
REINFORCING
BEAMS and C. B. SECTIONS
BEEF RAIL
BOLTS, NUTS, WASHERS, ALL KINDS
BORING and TURNING BARS and GRINDERS
BRACES, BOILER
CHAIN, ALL KINDS
CHANNELS
CHISELS
CHUCKS, STAYBOLT
CLAMPS, BOILERMAKERS
CLIPS, PATTERSON
CLEANERS, FLUE
CONDUCTOR PIPE
COPPER and BRASS
COUPLINGS, HOSE
CRAYONS, SOAPSTONE
CUTTERS
DARDELET RIVET and MACHINE BOLTS
DRILL RODS
EAVE TROUGH and FITTINGS
EXPANDERS, FLUE
FERRULES, COPPER
FLANGES, BOILER and TANK
FLOOR PLATES
GALVANIZED SHEETS, BARS, BANDS, ETC.
HANDLES, HAMMER
HEADS, TANK and FLANGE
HOISTS, HAND and POWER
IRON, STAYBOLT
LUGS, BOILER, TANK and SILO
MACHINERY, HAND and POWER
MANHEAD PLATES and FITTINGS
NAILS
PACKING
PAINT STICKS
PLATE STEEL, STANDARD QUALITIES
ABRASION RESISTING
COR-TEN and MAN-TEN
PLUGS, FLUE
RAILS and FITTINGS
REAMERS
SHAFTING
SHEETS
ABRASION RESISTING
ELECTRICAL
COR-TEN and MAN-TEN
HOT ROLLED and UNIFORM BLUE
WELLSVILLE POLISHED
COLD ROLLED
STAINLESS STEEL
GALVANIZED and GALVANNEALED
LONG TERNE
CORRUGATED
U·S·S COPPER STEEL
SPRING STEEL BARS and SHEETS
STAINLESS STEEL
STRIP STEEL, CR and HR
TEES
TIRE, ROUND EDGE
TOOLS, HAND and POWER for BOILER and IRON WORK
TROLLEYS
TUBES, BOILER
TURNBUCKLES
VALVES, BLOW-OFF
WELDING ROD and WELDERS
ZEES

USS Scully Service

SCULLY ST. LOUIS WAREHOUSE

"Last Saturday we received a wire from the oil fields requesting immediate shipment of two kegs of Bolts for a break-down job and we made shipment that day."

SCULLY NEWARK WAREHOUSE

"Order for carload of C Beams received at 2 o'clock for use on railroad bridge damaged by flood — shipped same day at 4 o'clock."

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UNITED STATES STEEL

The Revised Gravity and Mechanical Warm Air Heating Code of Toledo, Ohio

This concludes our publication of the heating and licensing ordinance of Toledo. Through the courtesy of the Toledo Sheet Metal and Roofing Contractors' Assn., Inc., copies of the code are available, free of charge, to associations and individuals interested in promoting a local code. If a printed copy is desired, address Henry C. Bitter, Secretary, 714 George St., Toledo.

Mechanical Warm Air Heating

Section 501. A Mechanical Warm Air Heating System shall consist of one or more direct or indirect fired Heaters enclosed within casings; warm air supply ducts, pipes and fittings; smoke pipe and fittings, cast and steel dampers, registers, faces and grills, blower and filters; automatic controls, motors, belts, switches, and all appurtenances necessary to provide a complete and efficient plant for warming, filtering, humidifying, and, circulating air for the creation of proper comfort during all winter weather conditions. The incorporation of an air washer, cooling coils or other devices shall not change the classification of such a system.

The Amount of Air to Be Circulated, How Determined

Section 502. The amount of air to be provided for each room or space to be heated shall not be less than that determined in the following manner:

(a) Calculate the heat loss of each room to be heated, in B. T. U. per hour.

(b) Determine an average, or design temperature in the warm air supply ducts, and also in the cold air return ducts. The design temperature in warm air ducts shall not exceed 150° F. at the register, and at cold air registers shall not be less than 65° F.

(c) Refer to following chart and arrive at c. f. m. by multiplying B. T. U. loss per hour, times decimal factor.

Five complete air changes per hour shall be the minimum permitted.

Section 503. An Individual Supply System shall consist of separate ducts or pipes, rectangular or round, each extending directly from the heating unit to the warm air register. Rectangular ducts shall be as nearly square as possible. Return ducts may be individual or trunk lines.

Section 504. A Trunk Line System shall consist of one or more main ducts with branches leading to the register.

Duct Sizes, How Determined

Section 505. Ducts, in every case, shall be of ample size to warm the building to 70° Fahrenheit when outdoor temperature is zero. At no time shall the plenum chamber temperature exceed 200° Fahrenheit.

Section 506. The adjustable furnace switch or furnastat blower control shall be set at predetermined temperatures not exceeding 175° F. to start blower. The limit control shall be set not higher than 200° F.

Determine the size of each outlet, based on the volume as obtained in Velocity Table, for the proper outlet velocity:

Maximum Velocities Allowed

Section 507. Air Velocities in ducts and at the register in the various types of installation shall not exceed the following feet per minute:

	Low Velocity System	High Velocity System
Main Duct	500	1000
Branch Ducts	450	750
Wall Stacks	350	600
Baseboard Registers	350	400
Wall Registers Above Breathing Line	350	600

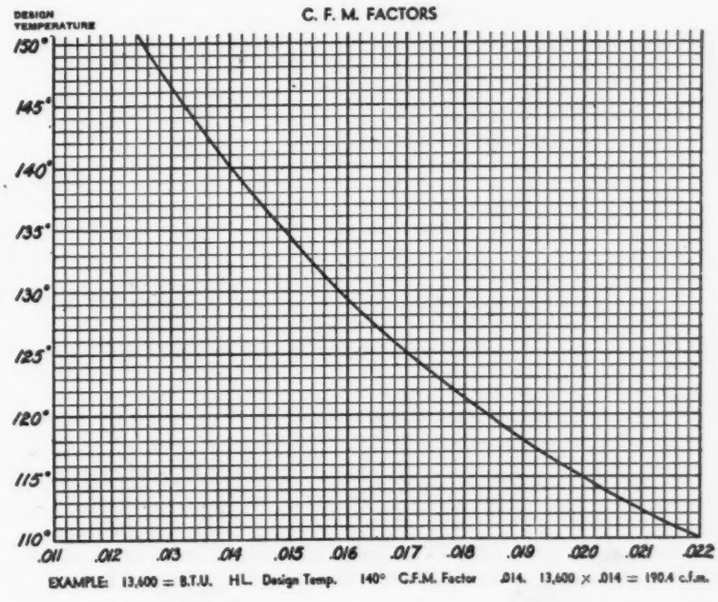
Low velocity systems apply to residential and commercial warming. High velocity systems apply to industrial plants. In industrial plants where noise is not objectionable, higher velocities may be used, subject to the approval of the Division of Inspection. Velocities through air washers, furnaces and filters, shall not exceed those specified or recommended by the manufacturers in their published data.

Dampers

Section 508. Each duct in an individual duct system, shall be provided with a volume damper with a positive locking device.

Each branch in a trunk system shall be provided with a splitter damper upon leaving the main duct, and again, if again divided. Each branch shall also have a volume damper. Each trunk shall be provided with a volume damper to regulate the air flow in each trunk. All damp-

(*Continued on page* 100)



Fox Valley

At the April meeting of the Fox Valley Furnace & Sheet Metal Contractors Association it was voted to hold sectional meetings. For this purpose the Association was divided into a North Section, composed of Dundee, Carpentersville, Hampshire and Elgin; and a South Section composed of Aurora, Batavia and Geneva. Members from Elburn, West Chicago and St. Charles to attend either.

Sectional meetings were held at Aurora and Elgin the first week of May with good turnouts. Alvin Lobauer was elected Chairman of the North Section.

The regular monthly meeting of the entire Association was held at Bobbitt's Cafeteria, May 15, 1939, with President Jack Stowell in the chair. A very fine attendance of 26 was present.

It was decided to hold our annual Field Day in July.

A letter from Ralph W. Poe, Secretary of the Illinois Sheet Metal Contractors Association, inviting delegates to a proposed Ways and Means meeting was read and discussed. It was moved that President Jack Stowell and Secretary George Bushman attend.

The highlight of the meeting was a lecture by Art Meiche of Chicago on short cuts to estimating. Our members look forward to hearing Mr. Meiche again at our next meeting when he will present tables showing how to arrive at pipe sizes for gravity and forced air.

Our next meeting will be held at Elgin, June 19th.

JACK STOWELL, President.

◆

Wisconsin

The Board of Directors and second district meeting of the Sheet Metal Contractors Association of Wisconsin was held May 12 upon invitation of the Madison Sheet Metal Contractors at Antlers Lodge, near Madison.

The following sheet metal contractors were admitted to membership:

Joe Anderson, 1505 Williamson St.; Al. Schmelzer, 1335 Gilson Avenue; Ritchie Heating & Sheet Metal Co., 2134 Winnebago Street; and Carrs Oil Burner Sales & Service Co., 144 Regent Street, all from Madison. A. Kroupa of Racine was accepted as a member upon the approval of the Racine local.

Memorial resolutions were passed upon the deaths of members Otto Guessenhainer and J. Yost, the former of Sheboygan and the latter of Racine.

It was voted that the secretary attend the next meeting of the National Secretaries' Conference.

Chairman Martin Schaar of the Warm Air Heating & Furnace Committee outlined their activities and expressed the belief that a license for the heating industry would be effective. Some agreed with him, but contrary opinions were given effectively. This part of the program was lengthy and interesting, most of those present taking part.

Overhead was brought up for discussion by the secretary, and a very able argument on this subject was given by G. G. Jones, president of Mohr-Jones Hardware Company, followed by others, and it seemed to be the opinion of our treasurer that we should employ the services of an auditor to audit books and then formulate a set up for the benefit of our members.

Ted Brenner, one of the officers and directors, invited the association to have their third district meeting at Fond du Lac, to be held June 10, at the Hotel Retlaw.

The Madison boys provided an after-the-meeting dinner, with the necessary refreshments.

PAUL BIERSACH, Secretary.

◆

Ohio

At a meeting of the officers and Board of Directors of the Ohio Association held at the Deshler Wallick Hotel, Columbus, Saturday, May 20th, William Lauer of Columbus who has served as president of the Ohio group the past two and one-half years resigned as state president and was elected to serve the organization as a member of its Board of Directors.

Oscar Hodgson of Barberton, vice president was elected to serve Mr. Lauer's unexpired term.

A. E. Bogen of Columbus was elected to the chair of Vice President, vacated by the new State president.

Mr. Lauer was given a vote of thanks by his fellow officers for his efforts in behalf of the Ohio association during his term of office, and the new state president was pledged 100 per cent support by his fellow officers.

Officers of the Ohio Association are now as follows:

President—Oscar Hodgson, Barberton.
Vice President—A. E. Bogen, Columbus.
Secretary—C. M. Gundlach, Sandusky.
Treasurer—William Feiten, Cleveland.
Directors: Clarence Christen, Toledo.
Charles Grote, Cincinnati.
William Lauer, Columbus.
H. L. Orton, Akron.
Jos. Dersher, Toledo.
D. A. Mannen, Cleveland.

C. M. GUNDLACH, Secretary.

◆

Copper and Brass

The Copper and Brass Mill Products Association held its annual meeting at The Greenbrier, White Sulphur Springs, W. Va., on May 18 and 19, at which time the following officers were elected:

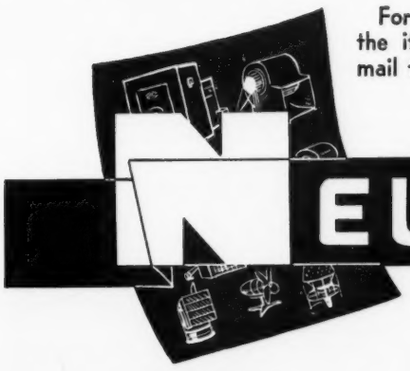
President—John A. Coe, The American Brass Company.
Vice President—R. E. Day, Bridgeport Brass Company.
Vice President—Wylie Brown, Phelps Dodge Copper Products Corp.
Vice President—R. L. Coe, Chase Brass & Copper Company.
Vice President—W. M. Goss, Scovill Manufacturing Company.
Treasurer—C. D. Dallas, Revere Copper and Brass Incorporated.
Secretary—T. E. Veltfort.

The Copper and Brass Mill Products Association is an association of manufacturers of sheet, rod, wire, pipe, tube and other mill products of copper, brass, bronze and related alloys. Its headquarters are at 420 Lexington Avenue, New York City.

◆

Thomas A. Fernley, Jr., Elected

Thomas A. Fernley, Jr., representing the National Wholesale Hardware Association, was elected secretary of the Council of National Wholesale Associations at the annual meeting of that group on Tuesday, April 11th.



NEW PRODUCTS

For your convenience a number has been assigned each item. Circle the items in which you are interested on the coupon on page 98 and mail to us.

● Indicates product not listed in 1939 Directory.
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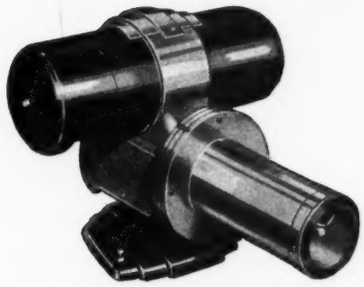


89—Model N Conversion Burner

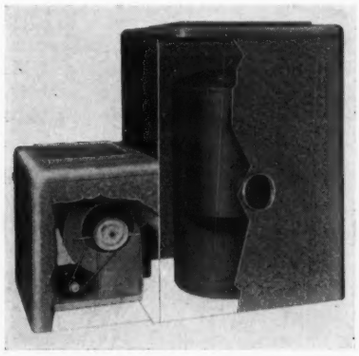
York Oil Burner Co., Inc., York, Pennsylvania, announces the new model N high pressure burner for conversion application, with a capacity of 0.7 to 3.5 g. p. h.

Accessories include ⅙ h. p. motor, two pole radio proof transformer; fuel pump and regulating assembly; and York nozzle.

◆

90—Package Unit

Premier Furnace Company, Dowagiac, Michigan, is offering the CS-B forced air package unit consisting of a



Premier riveted and welded steel furnace, blower equipped with special cast iron base and cast inlet rings, filters and streamlined cabinet finished in grey corduroy enamel for the low-priced competitive field. Sizes from 20 in. to 27 in.; Btu output at bonnet 84,000 to 144,000; cfm 664 to 1770.

◆

91—Attic Fans

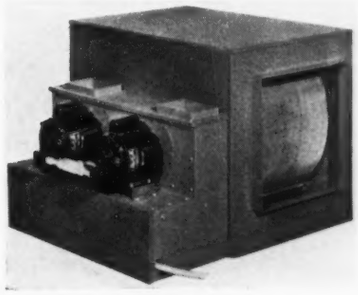
The Allen Corporation, 9751 Erwin Avenue, Detroit, announces an improved 1939 model attic fan in eight sizes and rated from 6,260 to 29,945 cfm.

The Type "H" (with a hood) has been developed for flat or near flat roof installations, and is set over an opening cut in the roof and flushed to the roofing material.

◆

● 92—Resaturating Cooler

Bryant Heater Co., 17825 St. Clair Avenue, Cleveland, announces the No. 14 Resaturating Cooler—utilizing the principle of lowering the temperature of air by allowing water to evaporate into it. The spray water is rapidly



recirculated; "make-up" water equal to the amount evaporated, is admitted through a float tank at the rate of about 3 gallons per hour. The spray water temperature is between 55 and 58 deg.

◆

93—Attic Ventilator

The Peerless Electric Company, Warren, Ohio, announces a new Peerless attic ventilator, which is portable, light in weight, equipped with grilles

for safety, housed in a cabinet treated with sound absorbing material, has automatic belt tension device, and motor equipped with thermal overload protection—in three sizes, 30, 36 and 42-inch with capacities varying from 5,500 to 11,000 c. f. m.

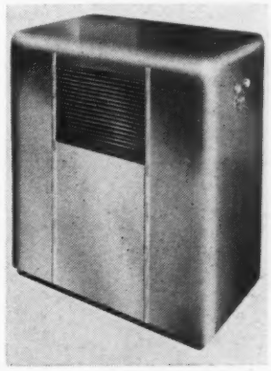
● 94—Power Flanger

The Lockformer Co., 4409 W. Kinzie St., Chicago, announces a new power flanger with a capacity of 18 to 26 gauge, designed for heating and ventilating shops. The machine is portable and plugs into any light socket. A single calibrated set wheel serves as adjustment for the various gauges. The drive pulley is adjustable for varying speeds.

◆

● 95—Cooling Unit

The Herman Nelson Corporation, Third Avenue, Moline, Illinois, announces a self-contained cooling unit for cooling and dehumidifying.



The unit consists of a reciprocating-type Freon compressor, water-cooled condenser, evaporator, fan and motor, all automatically controlled and housed in a cabinet of heavy-gauge steel.

The capacity is ¾ ton cooling; sensible heat rating 6,400 Btu per hr.; total heat rating 9,000 Btu per hr.; air circulation 360 cfm.

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△ 97—Bar-Brook Attic Ventilator

Shreveport Engineering Co., Inc., 1241 Dalzell St., Shreveport, La., manufactures the Bar-Brook attic ventilator, air circulators and window ventilators with capacities from 4,100 to 45,000 c. f. m., featuring cast aluminum blades, venturi throats, automatic doors and complete package units.

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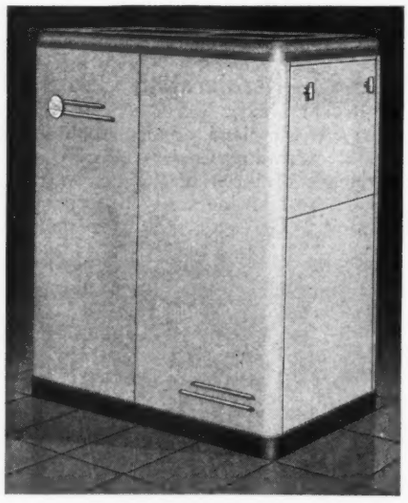

The unit includes filters, Comfortrol blower, heat exchanger, oil burner, Thermo-drip humidifier in a two-tone enameled casing; has an output at the register of 75,000 Btu per hour; and occupies a floor space slightly more than 2 by 4 feet.

Access door above filters can be opened for night air circulation.

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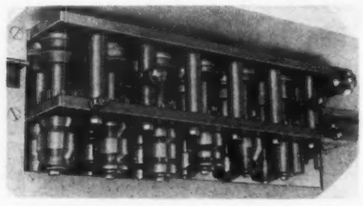

The standard unit includes built-in Pittsburgh rolls. Auxiliary rolls, available at extra cost, are double seam rolls, drive cleat rolls, straight right angle flange rolls, and butt cleat rolls (18 ga. only). Auxiliary rolls are built on extended shafts.

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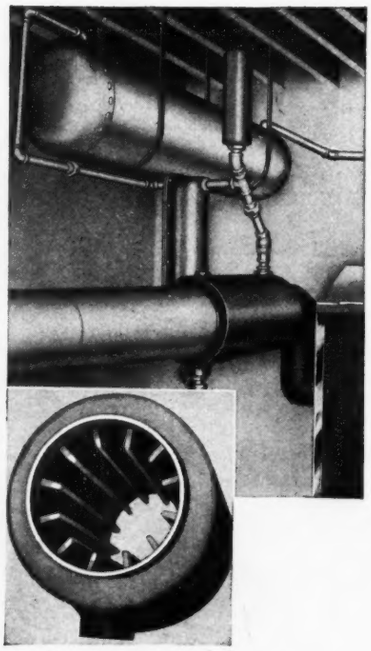

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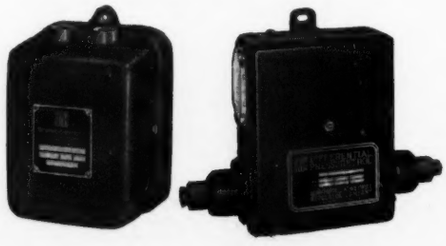

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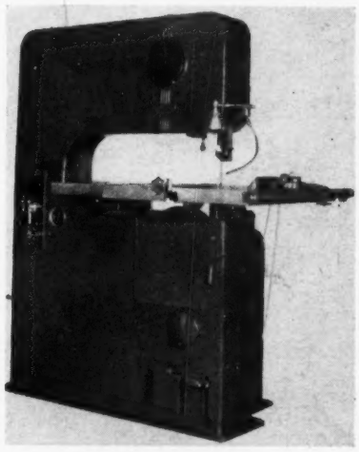

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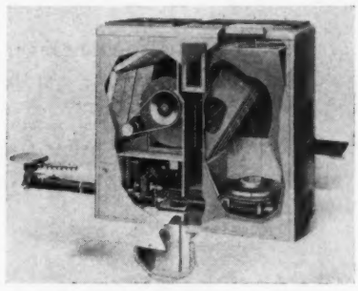

Maximum rated output is 250,000 Btu. per hour at 2,000 cfm and 180 degree register temperature.

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Electrol Incorporated, 934 Main Ave., Clinton, N. J., has developed the Special Model JM burner in two sizes —1 to 3 and 3 to 8 gallons per hour— in pedestal or flange mountings; ⅛ HP motor.

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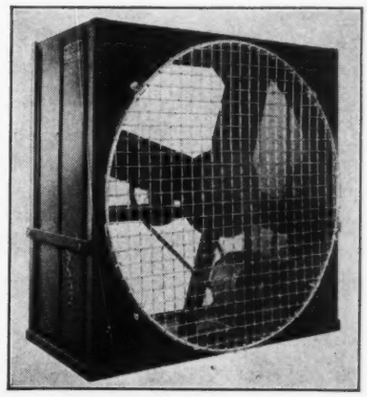

Drive is through a silent "V" belt by low horsepower, 1750 rpm, motor. Unit is mounted on vibration-absorbent material.

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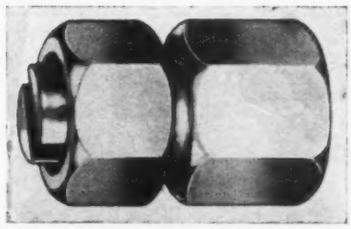

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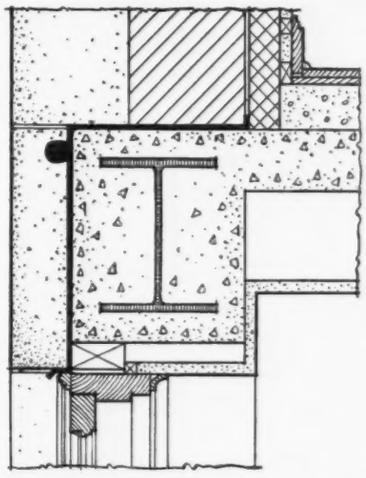

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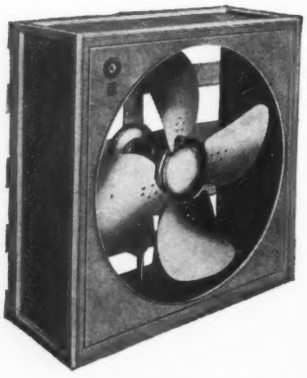

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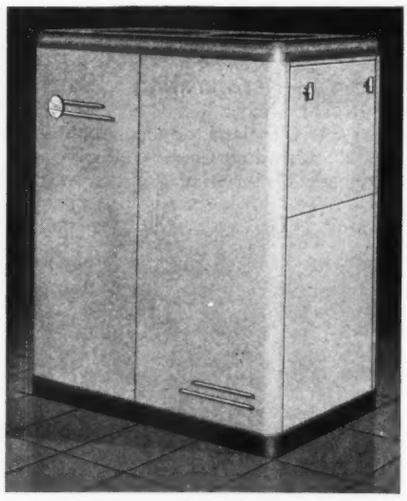

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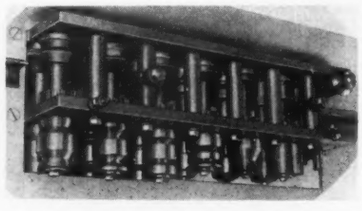

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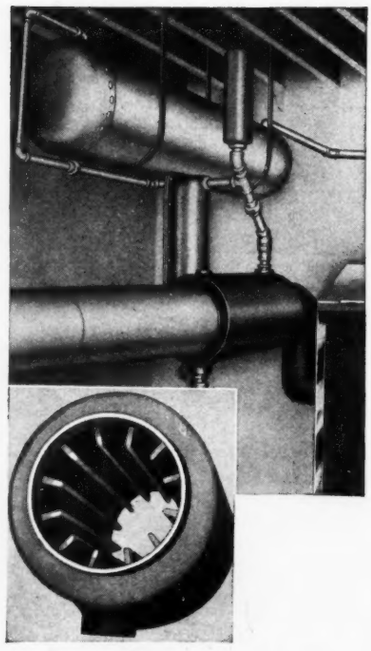

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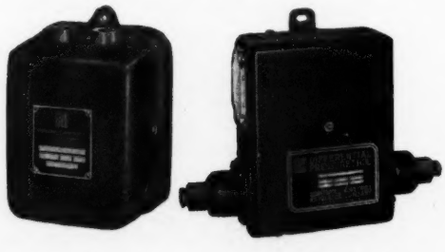

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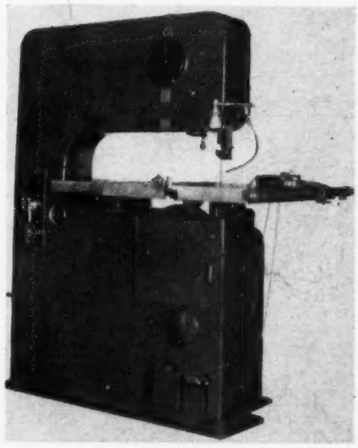

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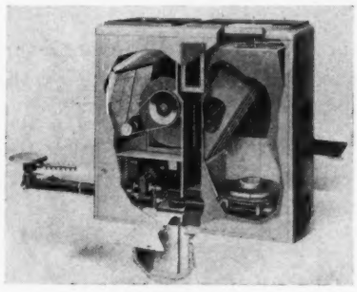

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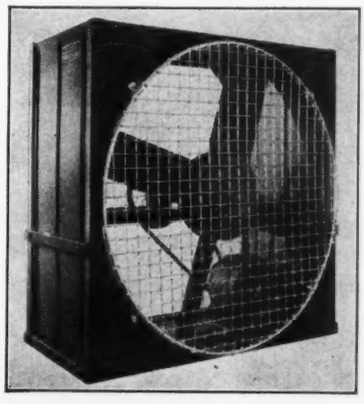

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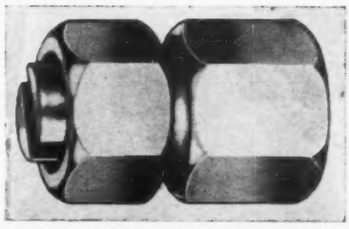

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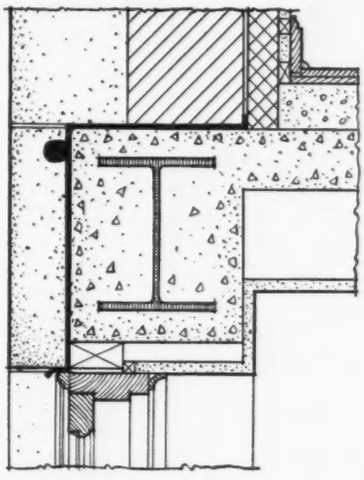

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ED: Just who are you, Small Fry?

LITTLE GUY: Me? I'm one of the Dust-Stop men.

ED: And you say you're working for me?

LITTLE GUY: You bet I am. I'm in the big-time magazines beginning August 12th. Telling people about the advantages of warm-air heating and urging them to replace their Dust-Stop Filters with new ones bought from you.

ED: What magazines?

LITTLE GUY: The best in our business. American Home, Better Homes and Gardens, Saturday Evening Post, and Life. Total circulation 8,750,000. Plenty of it right in your home town.

ED: Jiminy Christmas, that *is* good news!

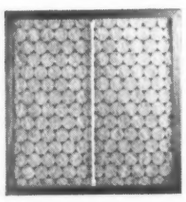
LITTLE GUY: Good? It's colossal! This Fiberglas Dust-Stop advertising should help you sell more air filters than you've ever sold before. Why, it'll increase your profits...

ED: How much?

LITTLE GUY: PLENTY! It all depends on how you get behind these Dust-Stop ads.

ED: Don't worry. I'll get behind 'em. I'll phone every man I ever sold warm-air heating to! I'll phone 'em this week!

LITTLE GUY: Great! And phone the folks some other contractor sold, too. The early bird's going to sell the filters.



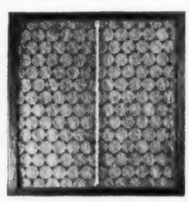
You can make a lot of extra money this year on

FIBERGLAS* DUSTOP* AIR FILTERS

*T. M. REG. U. S. PAT. OFF.

Manufactured by Owens-Corning Fiberglas Corporation, Toledo, Ohio

See Fiberglas at the Fairs—New York and San Francisco



READ HOW THIS AD CAN HELP YOU
MAKE MORE MONEY!

CAN YOUR FURNACE GET ITS BREATH?

1. **You're lucky** if you have a modern, forced warm-air furnace. It gives you comfortable, economical, wonderfully clean heat.

2. **But to get** the most out of it, make sure that it can get its breath.

3. **Almost all of these furnaces** breathe through very important little devices called air filters.

4. **These filters** strain the air before it is heated, clean it, make it more healthful and free from annoying dust. In doing this . . .

5. **They absorb so much dirt** that they eventually become clogged up—can't let enough clean, warm air through to heat your house—*waste* fuel.

6. **Look at your filters.** If they're too choked up to breathe, go to your furnace dealer and get new Fiberglas Dust-Stop filters.

7. **Dust-Stops remove dust,** dirt, and pollen from circulated air. Made of pure glass fibers, they are safe, efficient—cut down house cleaning.

8. **Save fuel.** Always have *clean,* healthful heat. Put new Dust-Stops in now. They're a cinch to put in and cost only $1.50 each.

P. S. If you're not already enjoying the comfort of clean, *filtered* air from your warm-air furnace, get in touch with your furnace man and find how inexpensively an air-filtering attachment can be installed. Write for Booklet X—It's free!

FIBERGLAS* DUSTOP* AIR FILTERS
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Manufactured by Owens-Corning Fiberglas Corporation, Toledo, Ohio
See Fiberglas at the Fairs—New York and San Francisco

National Contractor Conference

(*Continued from page* 34)

sented by their respective secretaries, or other duly accredited officer. All representatives shall have an equal voice in deliberations and discussions. In all matters however, which are deemed of such importance, that a more definite than a viva voce vote is required, each representative shall be entitled to vote pro-rata per-capita, casting one vote for each individual member of his association. Each representative shall present a certified credential stating the number of members in good standing in his association. Such certificates shall be filed with the Executive Secretary by each member-association, and shall be recertified prior to each Regional and National Conference.

Article VI
Meetings

This Conference shall hold one National Conference Annually. District, or Regional Meetings shall be held at such times and frequencies as the Board of Trustees or the Conference shall direct.

All Conferences shall be held in places most convenient, or centrally located, in each District, or in the Nation.

The National Conference shall be held in January of each year. All meetings shall be strictly for business, and shall be limited to one day duration so far as possible. Special or emergency meetings may be called by the Board of Trustees when an emergency exists, and the purpose of such special, or emergency meeting, and the business to be transacted, shall be stated in the call letter.

Article VII
Officers and Board of Trustees

The Officers of this Conference, shall consist of a President, four Vice-Presidents, an Executive Secretary, and a Treasurer. These Officers shall constitute the Board of Trustees of this Conference.

The term of office shall be for one year or until successors are duly elected and qualified, except, that officers elected at the first meeting shall hold office until the second annual Conference. Only officers of member-associations in good standing shall be eligible to hold office in this Conference. Election shall be by ballot, and shall be held at each annual Conference except as hereinbefore stated.

The President shall appoint a representative group consisting of twelve members, three from each of the following trades: Sheet Metal, Roofing, Warm Air Heating, and Air Conditioning.

It shall be the duty of each group to investigate, as far as possible, and report their findings upon any problem which may confront their respective industries.

Article VIII
Duties of Officers

The President shall preside at all Conferences and meetings of the Board of Trustees, and shall be ex-officio a member of all committees. He shall appoint the members of all committees. He shall perform all duties imposed by law or by order of the Board of Trustees, and shall exercise all rights on behalf of the Conference permitted by law and the Board of Trustees. He shall perform all other duties usually performed by the President of similar organizations.

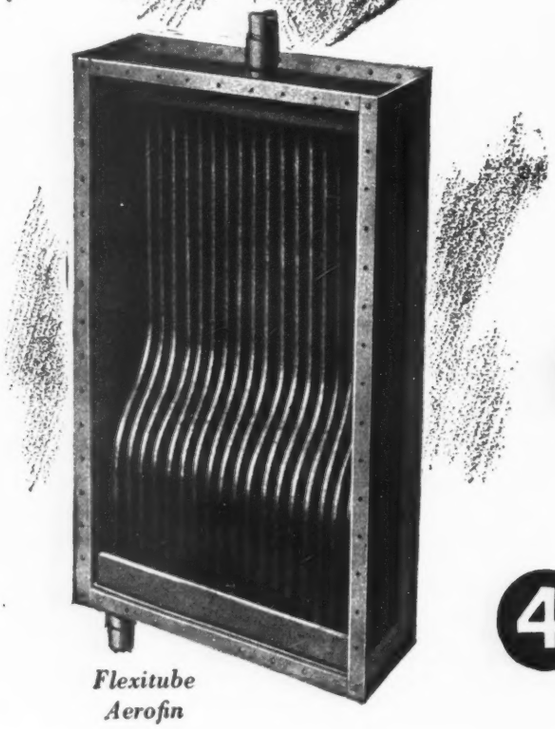
The Vice-Presidents, in order, shall perform the duties of the President in the event the office of the President is vacant, and in the event of his absence, inability, or refusal, to act. He shall perform such additional duties as may be imposed upon him by the Board of Trustees and as are usually performed by the Vice-President of similar organizations.

The Treasurer shall perform such duties as are imposed upon him by law or by the Board of Trustees. He shall be the custodian of the funds of the Conference and shall

Consider these Superior Points about

AEROFIN
Heat-Exchange Surface

1 Flexitube Aerofin has a core which is completely non-ferrous, having copper tubes and cast bronze headers.



Flexitube Aerofin

2 Flexitube Aerofin has patented joints between tubes and headers which are brazed at 1200° F., the resulting bond being stronger than the tube itself.

3 Flexitube Aerofin has a patented crown type orifice in steam end of each tube, which assures adequate steam supply at all times and prevents clogging of the tube inlet by scale.

4 Flexitube Aerofin has offset bend in each tube to relieve differential expansion and contraction strains in the tubes, thus putting no strain either on tube or joint.

Send for descriptive literature.

AEROFIN CORPORATION

410 SOUTH GEDDES STREET
SYRACUSE, N. Y.

Chicago • Detroit • New York • Philadelphia • Dallas • Atlanta

The Exclusive
Metaphram Principle Makes Them

DEPENDABLE and DURABLE

MH

THE *Symbol* OF THE NEW AUTOMATIC HEATING

METAPHRAM* REGULATORS

for LOW COST FURNACE CONTROL

METAPHRAM combustion regulators are self contained. The unusual and exclusive design of the individual sectional diaphragm, or Metaphram, which is made of the highest quality admiralty brass is responsible for their power and durability. Sensitive elements in all Metaphram Regulators may be easily replaced in case of damage.

METAPHRAM WARM AIR FURNACE REGULATORS

OPERATE draft and check dampers so as to maintain balance between casing and return air temperatures. Provides safety by preventing excessive furnace temperatures, economy and comfort through elimination of overheating and underheating and labor saving by reducing number of firing periods.

METAPHRAM TANK HEATER REGULATORS

PROVIDE continuous, abundant supply of domestic hot water from coal fired tank heaters. Available in two types, immersion and surface. Mounted on vertical or horizontal pipe line, or on storage tank. Easily installed without draining water system. The lever arm of the surface type regulator is marked so that it may be adjusted for any desired water temperature.

Minneapolis-Honeywell Regulator Co., 2726 4th Ave. S., Minneapolis

MINNEAPOLIS-HONEYWELL

* Trade Mark

Metaphram Regulators

You Save 3 Ways with GALE

"Pre-Fabricated" DUCTS AND FITTINGS

1. You Lower Shop Costs

GALE "Pre-Fabricated Ducts and Fittings will handle UP TO 95% of your jobs complete. This means a big extra profit for you at your regular quoted prices on your jobs—because "Pre-Fabricated" fittings made by standardized mass production methods in our factory cost you much less than fittings made one at a time in your own shop.

2. You Cut Installation Costs

You can install your job much quicker with GALE "Pre-Fabricated" Ducts and Fittings. All sizes are accurate—no delays. This not only makes a big extra profit for you, but pleases your customer by getting the job done promptly. It enables you to handle more work during the rush season.

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3125 Hiawatha Ave., Minneapolis, Minn.

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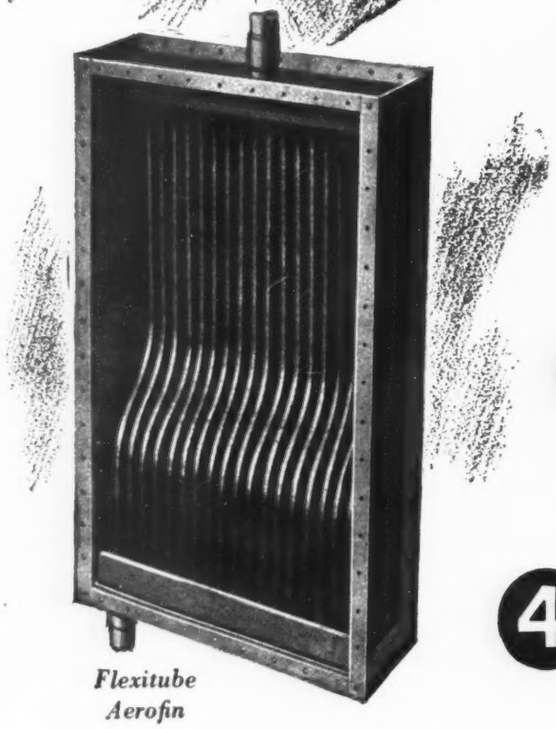

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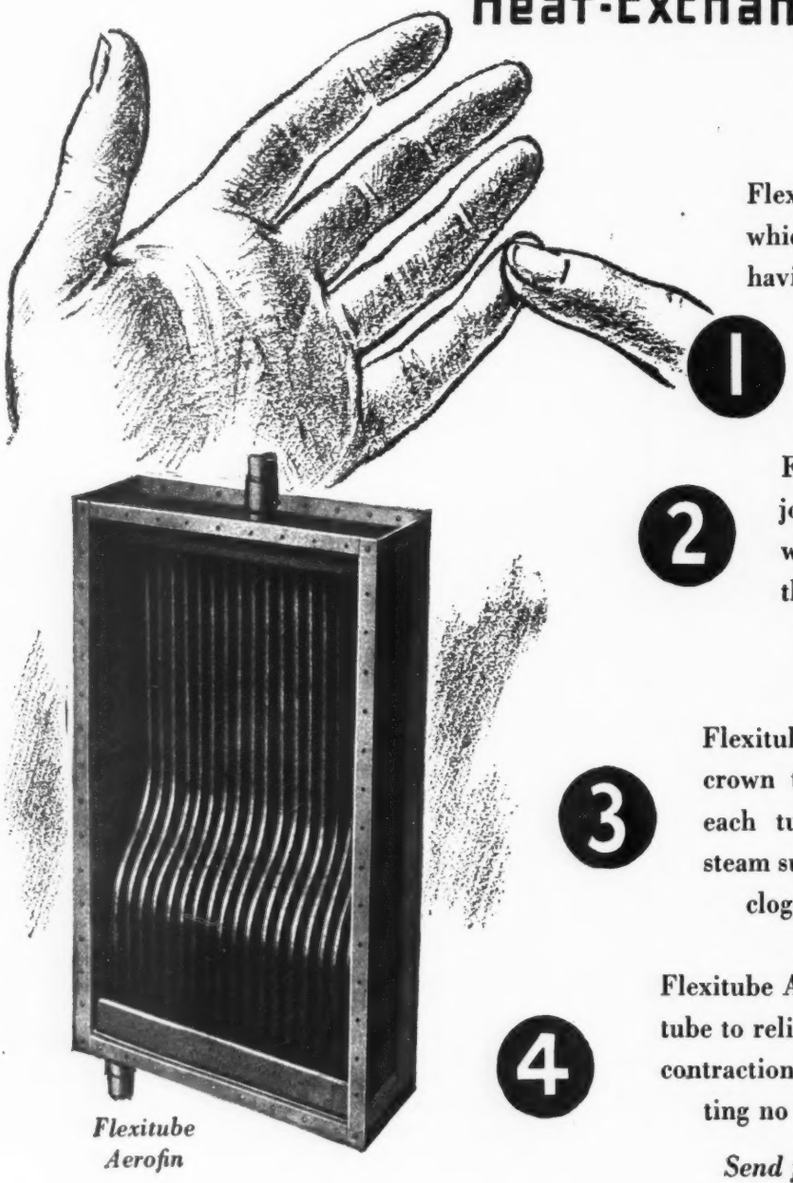

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perform further, all duties usually performed by the Treasurer of similar organizations.

The Executive Secretary shall perform such duties as are imposed upon him by law, or by the Board of Trustees, and shall perform further all duties performed by the Executive Secretary of similar associations. He shall be ex-officio member of all committees, and shall serve as General Manager of the Conference.

Any other officers, and/or employees, appointed by the Board of Trustees, shall perform such duties as are imposed upon them by the Board of Trustees.

Article IX
Fees and Dues

The membership or entrance for State and Local member-associations shall be on per capita basis. The fee shall be $..... for each individual member in good standing.

The annual dues for member-associates shall likewise be paid on per capita basis. The minimum annual dues shall be $..... for each individual member in good standing at the beginning of each fiscal year of the Conference. Dues shall be payable in advance for the ensuing year.

A Finance Committee, consisting of the Treasurer, the President and the Executive Secretary, shall meet and prepare a budget for each ensuing fiscal year. Based upon such budget, the Finance Committee shall determine the dues to be paid by each member.

Notice of any meeting at which it is proposed to change the method of computing dues shall be given in writing to each member.

The Board of Trustees may assess fines for any offenses as ground for the expulsion of members, in such amounts as it shall deem proper, and the same shall be payable immediately.

Each member who shall receive special services from this Conference, shall pay therefor, such reasonable amount as may be fixed by the Board of Trustees.

Article X
Services to Members

The following services may be furnished to members in good standing in this Conference, subject to such terms and conditions as the Board of Trustees shall deem advisable.

Accounting and Auditing Services by accountants selected by the Board of Trustees.

Credit information service, supplied by an agency to be selected by the Board of Trustees.

Investigation of Warm Air and Air Conditioning equipment, apparatus, appurtenances and material; thereby tending to elevate the standard of such materials, apparatus, appurtenances and equipment; and, also, to discourage the installation of equipment of inferior and questionable quality and efficiency.

Investigate Sheet Metal and Roofing materials and products, report findings and make recommendations on quality of materials; and, the status and standing of the manufacturers thereof.

Conduct a Bureau for the investigation of methods of application of Sheet Metal and Roofing, and report developments and improvements from time to time.

Affiliation through this Conference with other associations or agencies as selected by the Board of Trustees.

Article XI
Receipts and Disbursements of Funds

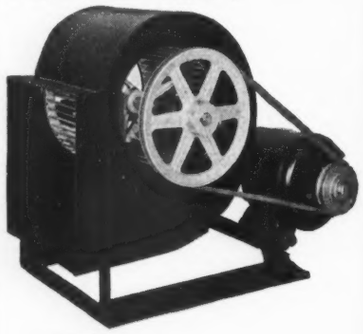
All monies payable to this Conference, shall be paid to its Executive Secretary, who shall issue to the payor the receipt of the Conference over his signature.

All monies received by the Executive Secretary shall be delivered to the Treasurer along with an itemized statement thereof; and the Treasurer shall give the Executive Secretary his receipt therefor.

The Treasurer shall deposit all monies received by him

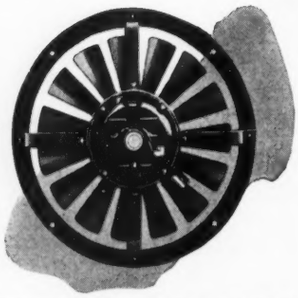
Peerless AIR CONDITIONING PRODUCTS

Peerless Belt Drive Blowers may be had complete, with or without motors. Blower wheels, scrolls and bearings may be ordered separately.



Peerless Direct Drive Panel Units can be supplied for either verical or horizontal mounting—with or without cabinet and filters.

FANS



A Peerless Multi-Blade Exhaust Fan—direct drive—with silent capacitor motor—variable speeds—supplied with either 16, 18, 24 or 30 inch diameter fan.

A Peerless "Ventilattic" Fan with thermal protected motor and automatic belt tension device.

Whatever Peerless equipment you select, you can be sure of economical operation, because Peerless makes the motor—and Peerless has been building quality electrical equipment for more than 46 years—equipment that has won an enviable reputation for low power consumption.

THE PEERLESS ELECTRIC CO., WARREN, OHIO

"For 46 Years—only the best"

You can't lose! These "aces" mean real SALES and PROFITS for you—just take a look!

(1) "Monthly Sales Promotion Calendar"—to help you make *more* money *every* month. (2) "Demonstrating Quickie"—ingenious new slide demonstrator that shows *what* a stoker *is*, *how* it *operates*. (3) Factory sales and advertising cooperation that gives you a "head-start" on sales. (4) Decisive proof that Econ-O-Col is *America's Greatest Stoker Value*. (5) Over 30 years' experience in "precision" products by a financially-sound stoker pioneering company —no "orphans!"

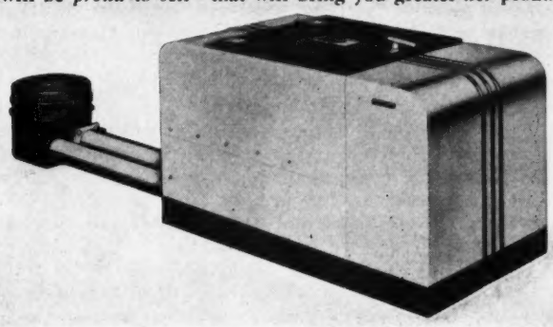
If you are an alert, willing, profit-seeking dealer . . . if you want to get into this fast growing stoker industry with "both feet" . . . write, wire or phone today for complete details on the exclusive Econ-O-Col franchise!

ECON-O-COL

The "Stronghearted" Stoker

MANUFACTURED BY COTTA TRANSMISSION CORPORATION, ROCKFORD, ILLINOIS

A Streamlined Beauty! Leader in a line of 22 models that you will be *proud* to sell—that will bring you greater *net* profit.



LONGLIFE MONCRIEF FURNACE

With the ***20*** *- year Guarantee*

Its Popularity Has Been Proved

We announced LongLife less than a year ago. It caught on from the very outset and has scored increasing sales everywhere.

You can sell LongLife. It gives enlarged opportunities for increased business and better profits. The 20-Year Guarantee gives the home owner positive assurance of durability and uninterrupted service. Send for specifications and prices.

The Henry Furnace & Foundry Co.

3473 E. 49th St. Cleveland, Ohio

Manufacturer of • Cast and Steel Furnaces • Winter Air Conditioners for Gas, Coal and Oil • Pipe, Fittings and Accessories for both gravity and air conditioning systems • Automatic Humidifiers • Moncrief Blower-Filter Units

GIVES YOU

- *speed,*
- *greater cutting capacity,*
- *elimination of finishing*

Difficult materials—such as tough, hard alloy steels are cut on the Campbell Cutamatic at the rate of a square inch every 12 seconds. Shapes up to 6 inches in diameter are handled with ease.

There is no danger of burning or case-hardening the material. No burrs are left. The cut surfaces are so smooth that later finishing operations are seldom required.

Write for the booklet "Design for Cutting Costs." It points out opportunities to make big savings.

BUY ACCO QUALITY *in Campbell Cutting Machines, Wright Hoists, Page Welding Electrodes, American Welded and Weldless Chains, Tru-Lay Preformed Wire Rope and Reading-Pratt & Cady Valves.*

ACCO TRADE MARK

ANDREW C. CAMPBELL DIVISION
DESIGNERS AND BUILDERS OF SPECIAL MACHINERY
BRIDGEPORT, CONNECTICUT

AMERICAN CHAIN & CABLE COMPANY, Inc.
In Business for Your Safety

in such bank or banks as shall be selected and approved by the Board of Trustees.

The funds of this Conference shall be disbursed in the following manner:

A voucher, for each bill of the Conference, shall be prepared and signed by the Executive Secretary.

Said voucher, when approved by the Board of Trustees, shall be delivered to the Treasurer and he shall issue a check over his signature, in the amount thereof, to the person named therein.

The foregoing shall not prohibit the Board of Trustees from establishing a petty cash fund, in such amount as it shall determine, which fund may be disbursed in such manner as it shall see fit.

No officer or member of this Conference shall incur any liability for or on behalf of this Conference, only with the approval of the Board of Trustees.

Article XII
Membership Certificates

Each member shall be entitled to receive a membership certificate.

Said membership certificates shall be in such form as shall be prescribed by the Board of Trustees.

Such membership certificate shall remain the property of this Conference and shall be surrendered upon the termination of membership therein.

Said membership certificate shall not be transferable.

Article XIII
Seal

The seal of this Conference shall be circular with the name of the Conference and the name of its National Headquarters surrounding.

Article XIV
Parlimentary Procedure

All meetings of members, Trustees and committees of this Conference, shall be conducted in accordance with Roberts Rules of Order.

Article XV
Miscellaneous

A member in good standing shall be a member who is not in default for the payment of any accounts, or for the compliance with any orders of the officers or Board of Trustees, and against whom charges have not been preferred, under the provisions of Article IV hereof.

No member, who is not in good standing, shall be entitled to any of the benefits or privileges of membership in this Conference, during the time in which he is not in good standing.

A majority of the member-associations' representatives being in attendance at any regularly called National Conference, District Meeting, Board of Trustees or Committee Meeting, shall constitute a quorum for the transaction of business. A majority affirmative vote of such quorum, on any question, at any regularly called meeting shall be required for the adoption or approval of any question before the house. A less than quorum assembly, may consider, deliberate and recommend, but shall not take action on any subject, only to adjourn such meeting to a given date.

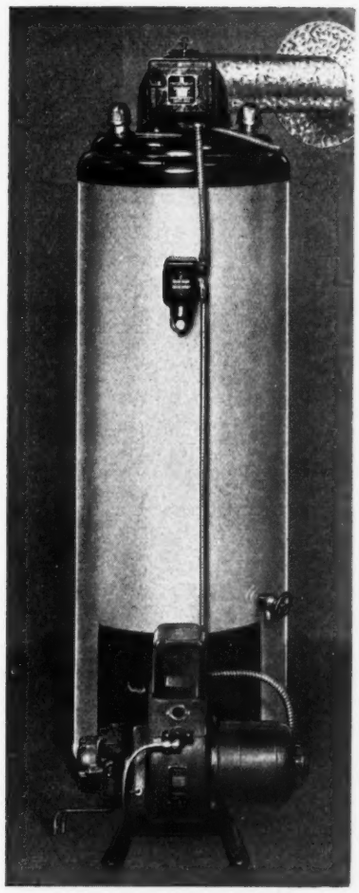
This Code of Regulations provides for District or Regional meetings. This provision is intended for use whenever, in the opinion of the Board of Trustees, the Conference membership has grown sufficiently or covers a sufficient area to warrant the establishment of Districts or Regions.

The Executive Secretary and the Treasurer shall give bond in such form, and in such an amount, as may be determined by the Board of Trustees.

Article XVI
Amendments

This Code of Regulations may be amended at any regularly called Conference, provided that the proposed amendment shall have been submitted in writing to the meeting, immediately preceding the meeting, at which action shall be taken thereon. All proposed amendments shall be plainly stated in the call-letter to such meeting.

Clarence J. Meyer, Buffalo, N. Y.
Carl F. Gundlach, Sandusky, Ohio
Henry C. Bitter, Toledo, Ohio
Committee.



AQULUX 85

A New Oil Burning Water Heating Unit

This powerful and compact vertical unit, beautiful in appearance, is designed to supply hot water at minimum cost in the modern home. It can also be used to supply heat and hot water automatically for small homes without the necessity for basement installation. Complete data on this new "package unit" now ready.

Burns No. 3 C. S. G. fuel or Diesel oil.

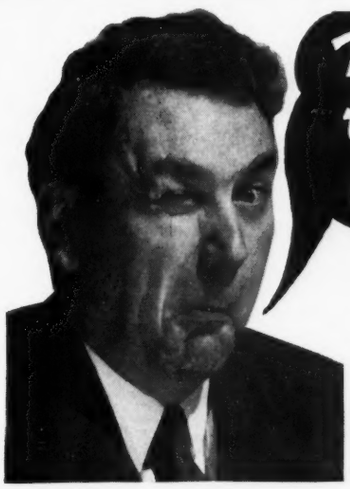
● *Worthwhile territories and Johnson franchises available to aggressive dealers anxious to serve their communities with a complete line. Write today giving full details to qualifications.*

S. T. JOHNSON CO.

940 ARLINGTON, OAKLAND, CALIFORNIA
401 N. BROAD STREET, PHILADELPHIA, PA.

MEMBER OBI OIL BURNER INSTITUTE

THERE'S A JOHNSON OIL BURNER FOR EVERY PURPOSE



The HESS Line includes every type of Furnace to fill your requirements

The HESS FRANCHISE offers You—

. One reliable source of supply with a background of 66 years of successful experience. The Hess line is complete, including welded steel furnaces up to one million B. t. u. capacity, blower filter units, oil burners, stokers, all accessories for complete installations. No job is too large or too small for Hess equipment.

Greater opportunities for sales because the Hess Furnace is distinctively different with more selling features than ordinary furnaces. It is rectangular throughout . . . not a round furnace with a square casing.

Real territory protection. No competition with other dealers in your vicinity selling the same item. Effective advertising materials, attractive consumer literature and successful sales plans, are furnished to Hess Dealers to help them secure prospects and orders.

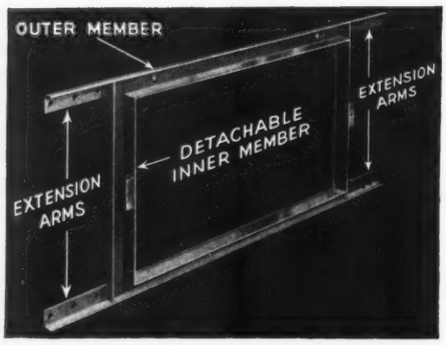
FREE!
Dealer Portfolio
Complete Details
and Sales Helps

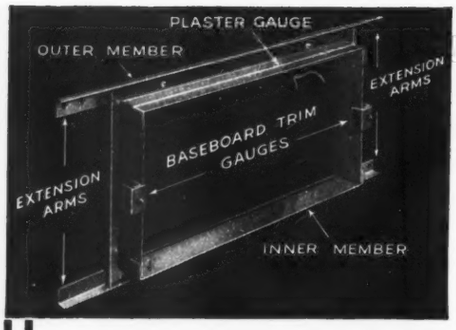
HESS BLOWER FILTER FURNACE

Modern forced air casing in galvanized or beautiful enamel finish. This combination of Hess Furnace and Blower Filter Unit gives complete winter air conditioning and summer benefits.

HESS WARMING AND VENTILATING CO. 1211-27 S. WESTERN AVE. CHICAGO, ILL.
Established 1873

H & C
No. 3
SIDEWALL
STUD
FRAME





H & C
No. 8
BASEBOARD
STUD
FRAME

You'll Actually be Money Ahead and Secure Better Installations by Using These Frames!

If you have been accustomed to making your installations without frames you have a pleasant surprise awaiting you the first time you use the H & C Frames shown above. You'll find that the small cost they involve is more than offset by the elimination of all blocking in, by the time and money saved through the avoidance of stackhead repairs due to damage done during construction, and the ease with which the registers can be quickly and accurately located.

Moreover, the use of these frames assures a solid, secure foundation for the register, *and the elimination of streaking;* in other words, better installations which actually cost less than when no frames are used. Ask your H & C Jobber about them, or write for complete details. *No. 39AC catalog is now being distributed.*

HART & COOLEY MANUFACTURING CO.
Warm Air Registers · Air Conditioning Grilles
Regulator Sets · H&C · Dampers · Chain
61 W. KINZIE ST. · CHICAGO · ILLINOIS
In Canada: Fort Erie N., Ontario

Ventilation in "G-Men's" Building

(*Continued from page* 57)

close to the ceiling and suitably weighted so that it will close in a positive manner.

The pivoted leaves of the louver are constructed of No. 16-gauge sheet steel. The leaves are installed in a channel-shape frame constructed of No. 10-gauge sheet steel. Average louvers are approximately four feet by five feet. These are two to a penthouse.

When one or both of the exhaust louvers close, the fan motor is so controlled it will stop.

An inclined tube draft gauge is installed at each air-filter.

All exposed galvanized metal work was given a phosphate pre-treatment. The pre-treatment was brushed on and followed within forty-eight hours by a paint priming coat of zinc chromate, iron oxide and a synthetic-resin varnish. The zinc chromate and the iron oxide was proportioned in the ratio of one (1) part of zinc chromate to two (2) parts iron oxide by weight. The pigment was between 35% and 40% by weight of the finished paint. After the priming coat thoroughly dried, a finish coal of aluminum paint was applied. The aluminum and varnish was mixed at the site and in the proportions of from 2 to 2½ pounds of aluminum powder to one gallon of varnish.

To fabricate and install the system Gichner set up a complete shop in the attic with brake, edger, shear and band tools. Measurements were taken directly from the place of work and the necessary fitting or section was fabricated in the job shop. This procedure was necessary because each unit was complicated by numerous building services and only direct measurements could be of any value.

Welding Aluminum Alloys

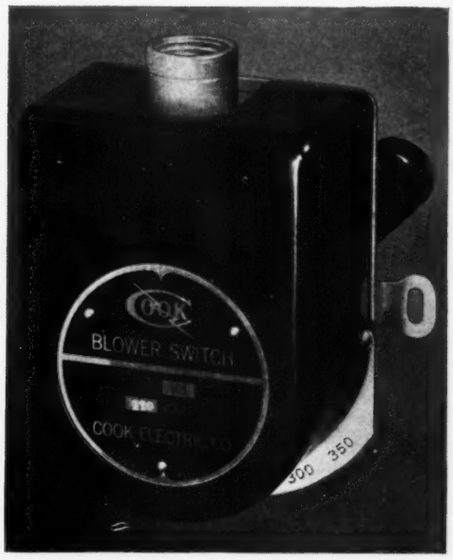
(*Continued from page* 61)

stops, the current is discontinued and the weld is completed.

Since the machine settings for various sections differ widely, it is not practical to give a table of values. Selections of suitable equipment should therefore be based on sufficient tests of the job being done to determine the electrical and mechanical requirements.

During the last couple of years, the butt welding of aluminum has made much headway. Typical examples of butt-welded products are washing-machine parts, ski-pole rings and wire and thread reels. By means of this process aluminum can be welded to copper. Such joints are used in certain electrical circuits on locomotives where both metals are employed.

DESIGNED TO SELL



COOK Warm Air Furnace Switches for Fan, Blower and Limit Control

There's every reason why this is the furnace switch to sell. It is priced to give you a good profit. It is engineered to give performance that frees you from troublesome, expensive service calls. It is styled to look as good as it is. It is designed for easy installation as well as efficient operation. The Cook furnace switch is made to order for the dealer who wants a control unit he can sell with confidence in its dependable operation—and sell at a good profit. Write for catalog page and prices.

COOK CONTROLS

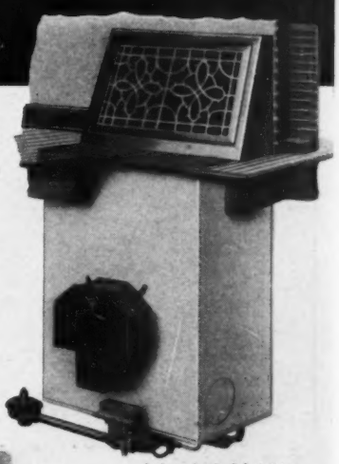
THERMOSTATS—FURNACE LIMIT CONTROLS
ZONE CONTROLS—BLOWER CONTROLS

COOK ELECTRIC CO.

2676 Southport Ave. Chicago

ISN'T THIS RIGHT UP YOUR ALLEY?

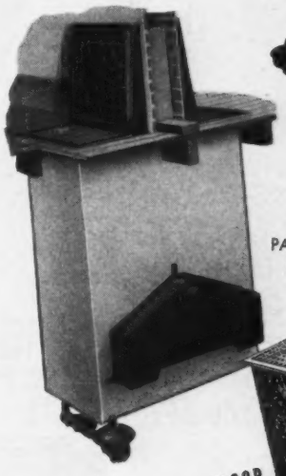
A Floor Furnace with Side Wall Registers!



TWO OUT OF FOUR PROSPECTS WANT "SOMETHING DIFFERENT"

Now you can sell Gas Floor Furnaces tailored to the job—complete, compact, easily installed. PACIFIC Floor Furnace, with either floor or side wall registers—for heating single rooms, two-room combinations or entire dwellings.

(Above) Model A-26 PACIFIC SINGLE WALL REGISTER FLOOR FURNACE



(Left) Model A-67 PACIFIC DUAL WALL REGISTER FLOOR FURNACE

(Above) Model A-24 PACIFIC GAS FLOOR FURNACE

NOW, A CORRECT TYPE FLOOR FURNACE FOR EVERY HOME!

Ever been "stumped" by a particularly tough job . . . narrow hall, living room with limited floor space . . . bedroom, den, nook or corner exceptionally "hard to heat"? Hundreds of homes have these problems. Again . . . PACIFIC supplies the answer—Gas Floor Furnaces with Dual or Single SIDE WALL REGISTERS. Extended base types for old houses avoid cutting into wall or plaster. Up-to-the-minute designs for new construction save installation costs. No more "jobs lost" because furnace won't fit. Write for typical floor plans . . . valuable sales ideas. There's more money than ever in Floor Furnaces . . . when you sell PACIFIC. Mail the Coupon . . . Today!

26 SUCCESSFUL YEARS

. . . and still growing!

Pin to your letterhead . . Mail today.

Pacific Gas Radiator Co. (Dept. AA-6)
1740 W. Washington Blvd., Los Angeles
Send complete literature and prices on—

Name.....

Address.....

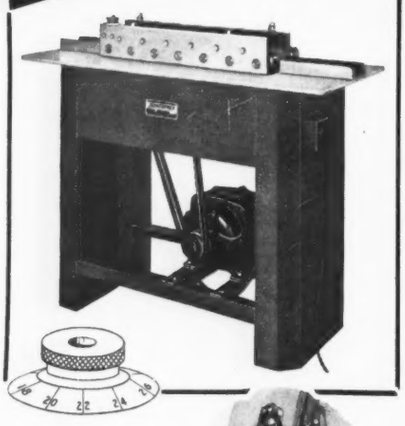
FLOOR FURNACES • FORCED AIR UNITS

Pacific

BASEMENT FURNACES • UNIT HEATERS

Now LOCKFORMER 18

THE *New*
HEAVY-DUTY, MULTI-PURPOSE
LOCKFORMER

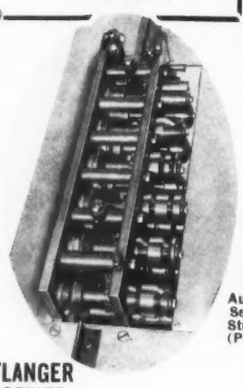


Precision built, rugged, dependable, a worthy companion to LOCKFORMER 22 — in daily use in all sections of the country. Its capacity, 18 to 26 Gauge, and the many auxiliary rolls in addition to Built-In Pittsburgh rolls give **LOCKFORMER 18** a wide range of use and labor saving in the heating, ventilating and air-conditioning field. Pittsburgh Rolls, shafts and gears are cut from **one piece of steel.** No set-screws or tapered pins used, so nothing can work loose and cause trouble. Roller bearings used throughout. LOCKFORMER precision assembly-line production brings the price within the reach of the average shop.

With Built-In Pittsburgh Rolls, ready for immediate operation,— $485.00*
F.O.B. Chicago
Auxiliary Rolls available: Double-Seam; Drive-Cleat; Butt-Cleat; Straight Right-Angle Flange. (Prices on request.)

CALIBRATED SETTING DIAL

Set by hand as easily as your watch. Regulates width of pocket on Pittsburgh lock to fit gauge of sheet. No extra hand operation necessary when changing Gauge.



NEW—POWER FLANGER by LOCKFORMER

Designed specially for the heating and ventilating shop, it fills a long felt need for a dependable **low priced** power-flanger. Capacity: 18 to 26 Gauge. Of sturdy, precision construction, light and easily moved around in shop or carried on job. Calibrated hand-set wheel adjusts operation to required Gauge. Drive pulley adjustable to varying speeds. Plugs in to any light-socket.
Price, made possible by LOCKFORMER production methods, ready for operation, F. O. B. Chicago **$135.00***

Uniform, precision locks speed up assembly and give duct and fittings neater and smoother finish. LOCKFORMER precision equipment cuts your shop costs, increases profits!

Supply dealers and jobbers handle and demonstrate the above Lockformer products, — also LOCKFORMER 22 and EASY EDGER (designed and manufactured exclusively by LOCKFORMER).
For specifications, sample-locks and demonstration see your dealer or write us.

THE LOCKFORMER CO.

4632 FLOURNOY STREET CHICAGO, ILLINOIS

*Prices subject to change without notice.

National Warm Air Convention

(*Continued from page* 28)

surface. If temperatures become great enough to sustain an oxidation process, a thicker wall will not prevent but only postpone failure at these points. Manufacturers' experience in design for efficiency, strength and correct fabrication should dictate the wall thickness. From the standpoint of the purchaser, a statement of the weight of material might advantageously be placed on the name plate and rating sheet of the furnace.

4—While the overall guaranteed Btu output will still be required, it seems for sake of easy comparison by purchasers, contractors, dealers, and other interested parties that some such unit as "square feet of grate surface" be used. Area of primary heating surface, area of secondary surface, and maximum flue gas temperature, should also be valuable. These above specifications, written upon the name plate and in the guarantee of the heating unit should do much to put the equipment on a par with the finest product of the manufacturing field and should be an aid to such agencies as FHA and building and loan associations in selecting and approving types of heating equipment.

Publicity Campaign

Allen P. Ames of Ames and Norr, New York City, discussing the publicity program, presented a number of large placards showing typical newspaper releases, also magazine and trade paper releases, a suggested cover for the new consumer booklet soon to be published, and a list of the radio stations which have used the radio publicity releases. Mr. Ames declared that editors of publications of all types seemed to like the material as written and released and editors in 29 states have already used material. Some of these editors have used two or three articles. As near as can be estimated, some 600 newspapers and 200 magazines have used material. Radio stations in about 45 states are receiving the releases for the home program. Mr. Ames declared that funds available are not sufficient for the committee to contact public utilities, but suggests that the public utilities should be contacted.

C. A. Olson presiding at the afternoon session, in connection with the publicity program, declared that the $9,000 fund subscribed last year is sufficient to carry the program to the end of July, but additional funds must be procured to renew the program or continue it beyond July.

Codes Committee

B. F. McLouth, Dail Steel Products, Lansing, Michigan, discussing the installation codes, showed a copy of the memorial edition to Prof. J. D. Hoffman, Purdue University, recently deceased, which is a very attractively bound booklet containing the standard, practical and technical code, as well as a brief resume of Prof. Hoffman's history and a very excellent picture of Prof. Hoffman. Individual

Randall One-Piece
Steel Housing
Pillow Block

FOCUS ON THIS NAME FOR BEARINGS

Randall

- Quiet
- Economical
- Durable
- Self-Lubricating
- Self-Aligning
- Large Oil Capacity

Write for catalog describing the complete Randall line*.

**Graphite Bronze Bushings in all sizes, too.*

Representatives carrying stocks

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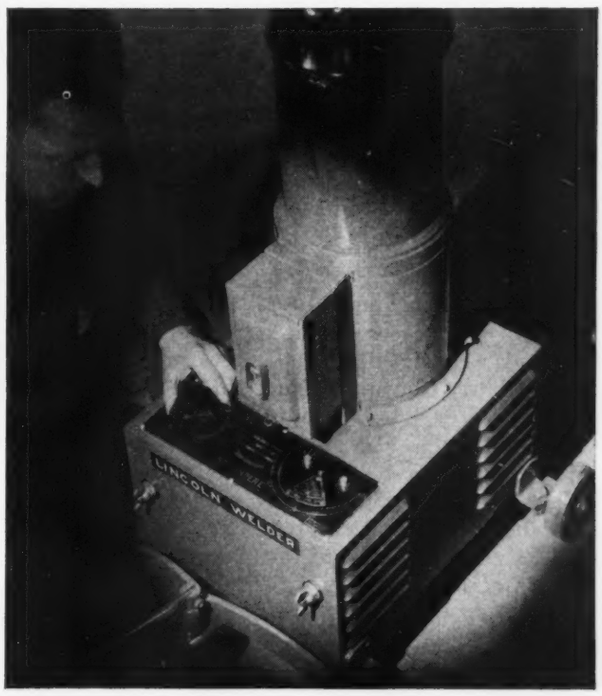
Randall GRAPHITE PRODUCTS CORP.
Dept. G11 609 W. Lake St., Chicago, Ill.

THE NEW WELDER *for sheet metal* PROFITS



THE LINCOLN "SHIELD-ARC JUNIOR" cuts costs and improves weld quality because:

SELF-INDICATING JOB SELECTOR provides the right TYPE of arc for every job. Assures maximum welding speed and simplifies welding of all metals and alloys. This continuous control simplifies setting.

SELF-INDICATING CURRENT CONTROL...also continuous in operation...provides the right AMPERAGE for every metal thickness, simplifying welding and assuring maximum quality.

Increase your business volume and lower your costs with this new Lincoln D.C. Welder. For further details, consult the nearest Lincoln office or mail the coupon.

THE LINCOLN ELECTRIC CO.

Largest Manufacturers of Arc Welding Equipment in the World

• MAIL THIS COUPON TODAY •

THE LINCOLN ELECTRIC CO., Dept. EE-605, Cleveland, O.

Send free Bul. 313 and payment details on the New Lincoln Sheet Metal Welder.

Name _____ Position _____

Company _____

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City _____ State _____

copies of this memorial edition may be obtained for $1.25 from the secretary of the association.

Mr. McLouth explained that very few changes in either of the three codes are contemplated. The chief change being that the Board of Fire Underwriters demanded that a register be not placed closer than six feet from the furnace, but this regulation has been revised to read six *equivalent* feet which counts in additional feet for elbows and turns and that there must be at least one 90 deg. turn in the pipe between the furnace bonnet and the register. A revision in the code will include 14 in. wide stacks to be made a single 28 ga. galvanized iron. Mr. McLouth suggested that the ASH&VE probably will approve the Technical Code at ASH&VE July meeting. One stumbling block to ASH&VE approval has been the wording previously used in the code "Use manufacturers' ratings" where particular types of equipment must be selected to fit particular requirements. This wording has been changed to "Consult manufacturer's catalog" and thus meet ASH&VE approval. The Technical Code committee was given the task last December of preparing a code of installation practices which might be incorporated in city and town ordinances and such code has been prepared by the Code Committee, and submitted to the Board of Directors of the Association for approval or modification.

Research Session

F. G. Sedgwick, Chairman of the Research Advisory Committee, opening the Wednesday morning Research Session, said he believed that so far our industry and association has overlooked one important function of an organization; namely, that the industry as a whole should realize its responsibility to the public and should police installations if necessary to see that such installations are made according to the practices which have been established through research. Mr. Sedgwick also called attention to the book by Prof. S. Konzo "Winter Air Conditioning" and said the sale of the book was proceeding in a satisfactory manner but the book should be in the hands of every contractor, salesman, manufacturer and the architects and builders as well.

Gilbert W. Denges, Williamson Heater Company, member of the Advisory Committee, outlined future investigations which will undoubtedly prove of inestimable value to the whole industry. These future investigations are

1—The Research Residence will be insulated and the effect of insulation on overall operating characteristics of a warm air furnace in an insulated house will be studied thoroughly. Practically all tests which have been conducted in an uninsulated house will be duplicated in the insulated house if results accruing from these proposed tests seem to warrant such a procedure. Comparative fuel and electrical consumption requirements, temperature gradients between floors and ceiling, all of the cooling tests conducted previously will be duplicated

A new low priced dependable
ATTIC FAN CONTROL

Also Suitable for Store Lighting and other Timed Switching

HERE'S a new line voltage time switch, designed primarily for attic fans but also applicable for store window lights or other electrical equipment where the current supply is to be automatically turned off at a predetermined time. This new M-H control is equipped with a dependable Con-Tac-Tor Mercury Switch, an exclusive feature. Operating direct on line voltage it requires no relay. It is equally applicable for new and old installations. This new time switch is an M-H quality product throughout, yet is exceptionally low priced. Be sure to stock and recommend it for every possible time switch application. Minneapolis-Honeywell Regulator Co., 2726 4th Ave. S., Minneapolis, Minn. Branch or Distributing offices everywhere.

A Quality JOB AT A COMPETITIVE PRICE

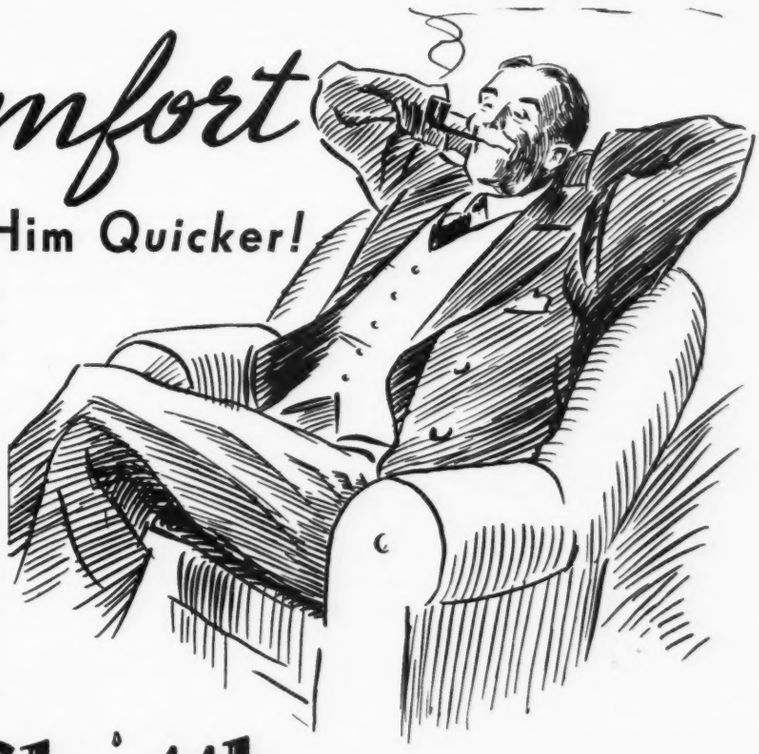
DEPENDABLE CONTROLS COST LESS THAN SERVICE

MINNEAPOLIS-HONEYWELL Control Systems

BROWN INDUSTRIAL INSTRUMENTS

Sell Comfort

. . . and You Sell Him Quicker!



DID YOU ever see a man who didn't like comfort—whether it is the brand of tobacco he smokes, the chair he relaxes in or the air he breathes?

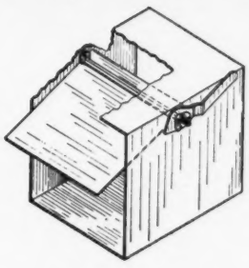
Yes, there can be comfort in the air he breathes if it contains the proper moisture during the months he heats his home, so why don't you "sell comfort" to those prospects whose homes are uncomfortable due to dry air? A Skuttle DS Automatic Humidifier is quickly and easily installed, and will properly moisten the heated air before it is circulated throughout the rooms. Here is a really trouble-free humidifier that will help "sell comfort" to your prospects as well as help you realize more profits.

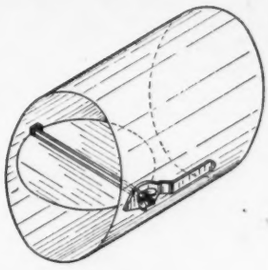
WRITE TODAY FOR **Skuttle** INFORMATION

J. L. SKUTTLE COMPANY — AUTOMATIC HUMIDIFIERS — 999 FRANKLIN ST., DETROIT, MICH.

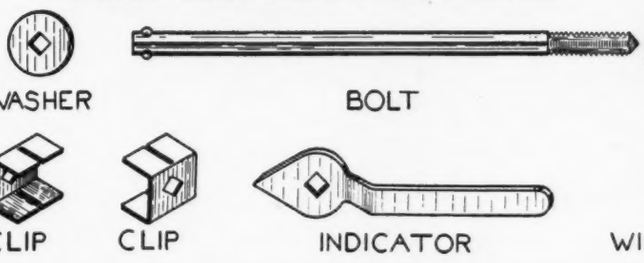
NEW Only ONE MINUTE to Install the NEW MINUTE DAMPER REGULATOR

Adaptable **to any Shape of Pipe (or Duct)**





New **SIMPLICITY OF DESIGN**



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Now it's here—the new patented MINUTE Damper Regulator—designed for speedier installation! In most cases it takes only one minute for the job. It's *efficient*—assuring rigidity and no sag or buckling of damper. Absolutely chatter-proof and air-tight. Eliminates tiny nuts, bolts, rivets and sheet metal screws. *Low in cost.* Guaranteed dependable. Mail coupon for FREE TRIAL.

Distributors: Write for details on the attractive Minute Proposition.

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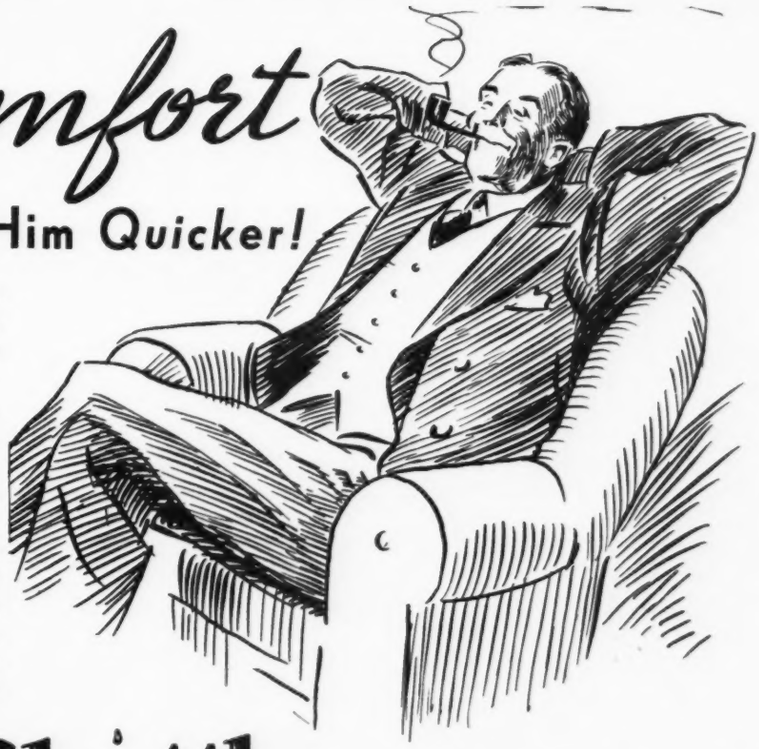

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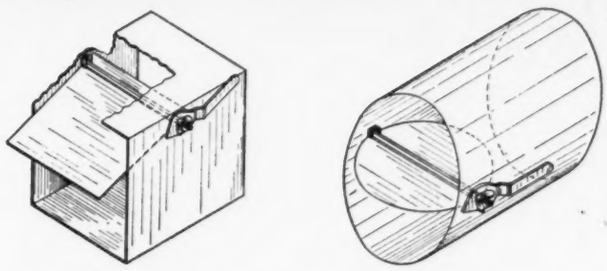
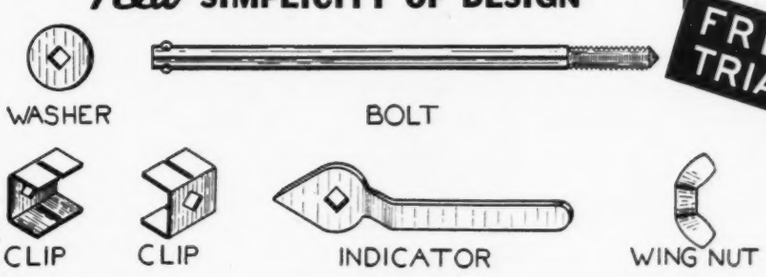
NEW Only ONE MINUTE to Install the NEW MINUTE DAMPER REGULATOR

Adaptable to any Shape of Pipe (or Duct)



New SIMPLICITY OF DESIGN



★ Saves TIME, MONEY and WORK!

Now it's here—the new patented MINUTE Damper Regulator—designed for speedier installation! In most cases it takes only one minute for the job. It's *efficient*—assuring rigidity and no sag or buckling of damper. Absolutely chatter-proof and air-tight. Eliminates tiny nuts, bolts, rivets and sheet metal screws. *Low in cost.* Guaranteed dependable. Mail coupon for FREE TRIAL.

Distributors: Write for details on the attractive Minute Proposition.

FREE TRIAL

JOAL MANUFACTURING CORPORATION
2058 Canton St.
Toledo, Ohio

Please send me a FREE SAMPLE of the Minute Damper Regulator and price list.

Name .....

Address .....

City ..... State .....

Distributor's Name .....

Address .....

copies of this memorial edition may be obtained for $1.25 from the secretary of the association.

Mr. McLouth explained that very few changes in either of the three codes are contemplated. The chief change being that the Board of Fire Underwriters demanded that a register be not placed closer than six feet from the furnace, but this regulation has been revised to read six *equivalent* feet which counts in additional feet for elbows and turns and that there must be at least one 90 deg. turn in the pipe between the furnace bonnet and the register. A revision in the code will include 14 in. wide stacks to be made a single 28 ga. galvanized iron. Mr. McLouth suggested that the ASH&VE probably will approve the Technical Code at ASH&VE July meeting. One stumbling block to ASH&VE approval has been the wording previously used in the code "Use manufacturers' ratings" where particular types of equipment must be selected to fit particular requirements. This wording has been changed to "Consult manufacturer's catalog" and thus meet ASH&VE approval. The Technical Code committee was given the task last December of preparing a code of installation practices which might be incorporated in city and town ordinances and such code has been prepared by the Code Committee, and submitted to the Board of Directors of the Association for approval or modification.

Research Session

F. G. Sedgwick, Chairman of the Research Advisory Committee, opening the Wednesday morning Research Session, said he believed that so far our industry and association has overlooked one important function of an organization; namely, that the industry as a whole should realize its responsibility to the public and should police installations if necessary to see that such installations are made according to the practices which have been established through research. Mr. Sedgwick also called attention to the book by Prof. S. Konzo "Winter Air Conditioning" and said the sale of the book was proceeding in a satisfactory manner but the book should be in the hands of every contractor, salesman, manufacturer and the architects and builders as well.

Gilbert W. Denges, Williamson Heater Company, member of the Advisory Committee, outlined future investigations which will undoubtedly prove of inestimable value to the whole industry. These future investigations are

1—The Research Residence will be insulated and the effect of insulation on overall operating characteristics of a warm air furnace in an insulated house will be studied thoroughly. Practically all tests which have been conducted in an uninsulated house will be duplicated in the insulated house if results accruing from these proposed tests seem to warrant such a procedure. Comparative fuel and electrical consumption requirements, temperature gradients between floors and ceiling, all of the cooling tests conducted previously will be duplicated

A new low priced dependable
ATTIC FAN CONTROL

Also Suitable for Store Lighting and other Timed Switching

HERE'S a new line voltage time switch, designed primarily for attic fans but also applicable for store window lights or other electrical equipment where the current supply is to be automatically turned off at a predetermined time. This new M-H control is equipped with a dependable Con-Tac-Tor Mercury Switch, an exclusive feature. Operating direct on line voltage it requires no relay. It is equally applicable for new and old installations. This new time switch is an M-H quality product throughout, yet is exceptionally low priced. Be sure to stock and recommend it for every possible time switch application. Minneapolis-Honeywell Regulator Co., 2726 4th Ave. S., Minneapolis, Minn. Branch or Distributing offices everywhere.

DEPENDABLE CONTROLS COST LESS THAN SERVICE

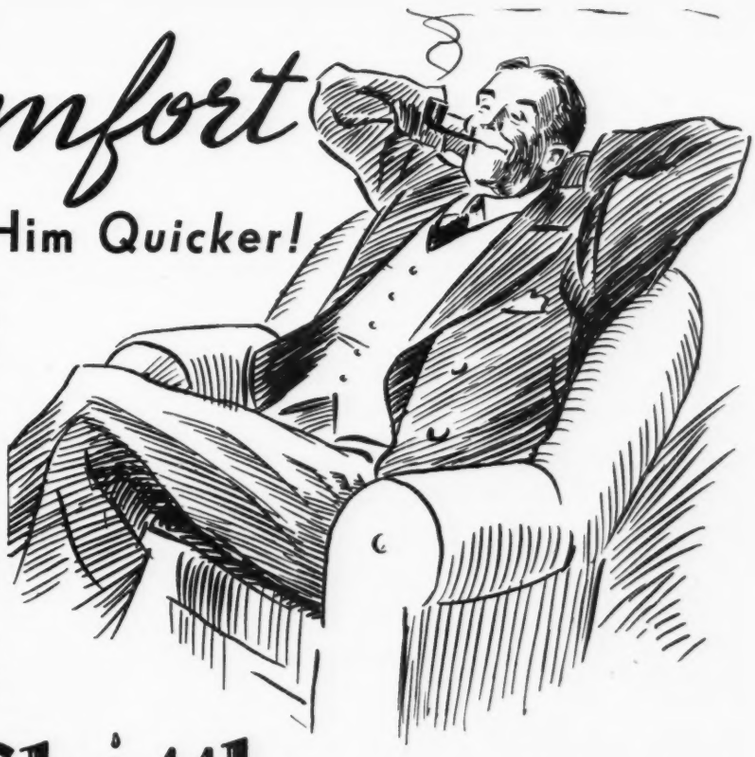
A Quality JOB AT A COMPETITIVE PRICE

MINNEAPOLIS-HONEYWELL Control Systems

BROWN INDUSTRIAL INSTRUMENTS

Sell Comfort

. . . and You Sell Him Quicker!



DID YOU ever see a man who didn't like comfort—whether it is the brand of tobacco he smokes, the chair he relaxes in or the air he breathes?

Yes, there can be comfort in the air he breathes if it contains the proper moisture during the months he heats his home, so why don't you "sell comfort" to those prospects whose homes are uncomfortable due to dry air? A Skuttle DS Automatic Humidifier is quickly and easily installed, and will properly moisten the heated air before it is circulated throughout the rooms. Here is a really trouble-free humidifier that will help "sell comfort" to your prospects as well as help you realize more profits.

WRITE TODAY FOR **Skuttle** INFORMATION

J. L. SKUTTLE COMPANY — AUTOMATIC HUMIDIFIERS — 999 FRANKLIN ST., DETROIT, MICH.

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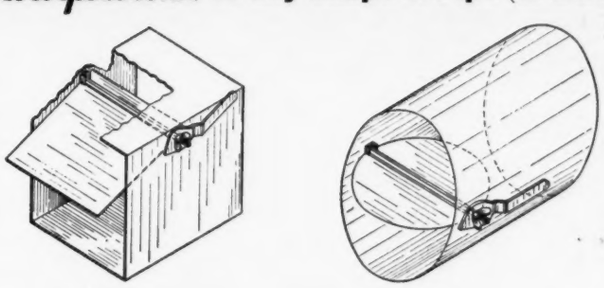
Adaptable to any Shape of Pipe (or Duct)



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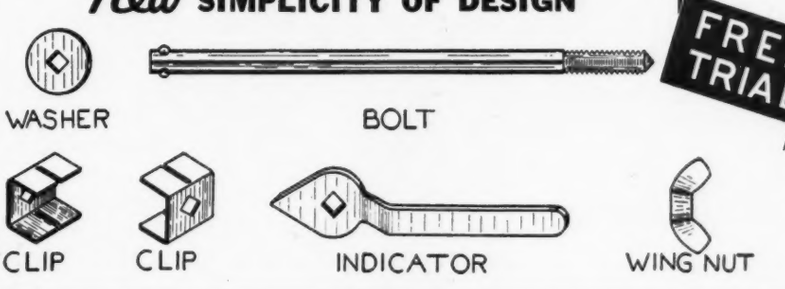

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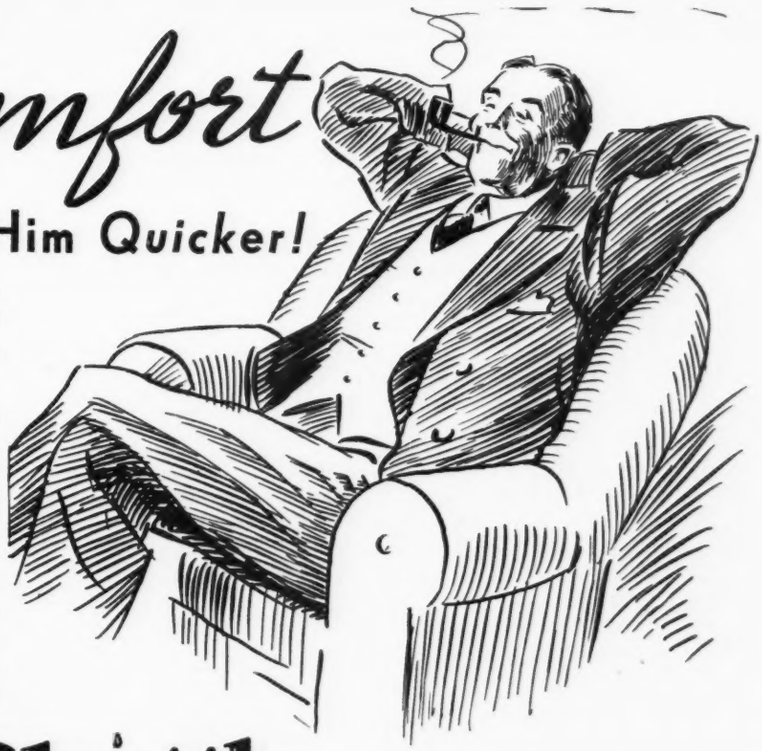

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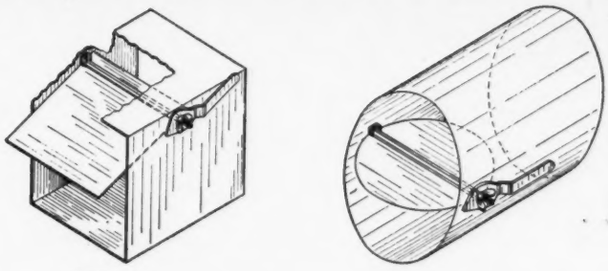

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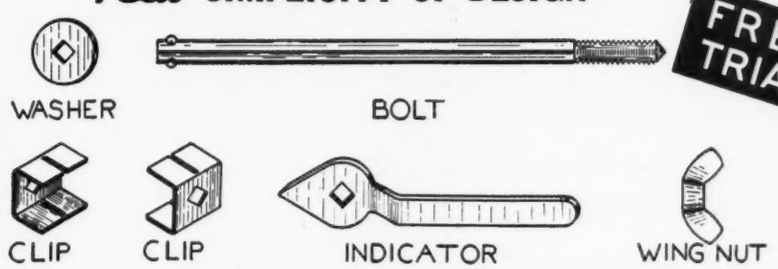

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Distributor's Name .....

Address .....

during the coming summer and winter. After these tests have been completed on the system exactly as it was used in the uninsulated house, a completely new heating system will be designed and installed just as it would be where the contractor is designing primarily for an insulated house.

Combustion

Prof. A. P. Kratz, speaking on "Principles of Combustion," explained the fundamental chemical reactions which take place when fuel is burned in a furnace. Professor Kratz showed the chemical formulas and equations which indicate the changes in hydrogen and oxygen and carbon and nitrogen and explained how these fundamental principles are concerned where hard fuel is burned in a stoker or oil is burned in a burner. This discussion can be presented so much more logically and clearly by the use of figures and charts such as Prof. Kratz used that we hope to publish this address as a separate paper or to include it in a series of articles which will be published in a later issue.

Stokers in the Research Residence

Prof. S. Konzo, discussing "Performance of Stokers in the Research Residence" outlined the characteristics of a forced warm air heating system as

1—Rapid response to changes in combustion

2—Some gravity operation on the off-cycles of the fan

3—A furnace able to generate only sufficient heat to offset the Btu heat loss and as heat is required

4—Operates most satisfactorily when the minimum combustion rates are maintained

An interesting series of reports from the stoker tests indicated that a control system wherein the thermostat operates the stoker and the fan starts and stops on bonnet temperature results in slight underrun and overrun of room temperature, but is a simple and fairly cheap control hook-up. The Research Residence obtained best results with a control system wherein the thermostat operates through a low-limit bonnet thermostat for the fan and a high-limit bonnet thermostat for the stoker or damper motor, so that the fan can run when the room thermostat calls for heat without the stoker operating if there is warm air in the bonnet or both the fan and the stoker can operate simultaneously or the stoker can run with the fan idle to bring up bonnet temperature if necessary. Or, the fan can run independent of the thermostat or stoker if bonnet temperature exceed a setting of 195 deg. F. For stoker-fired jobs, the stoker hold-fire unit should be wired in parallel with the fan bonnet switch so that when bonnet temperatures are in the fan operating zone the hold-fire does not start and stop the stoker.

In an investigation to disclose whether or not setting night temperatures back resulted in a fuel saving, tests were conducted with the thermostat set at 62 deg. during the night as compared to 72 deg.

Quick trigger release speeds up roll forming operations . . . upper slip roll swings forward horizontally for easy operation without lifting.

Write for Catalog 94

NIAGARA MACHINE & TOOL WORKS

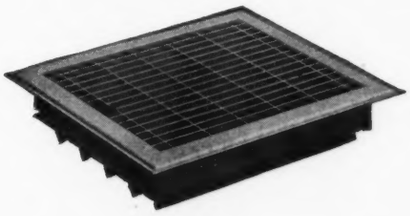
BUFFALO, N. Y.

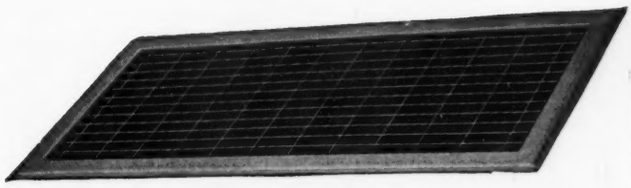
BRANCHES: NEW YORK CLEVELAND DETROIT

For Enduring Beauty—

DuraBilt

Floor Registers and Cold Air Faces





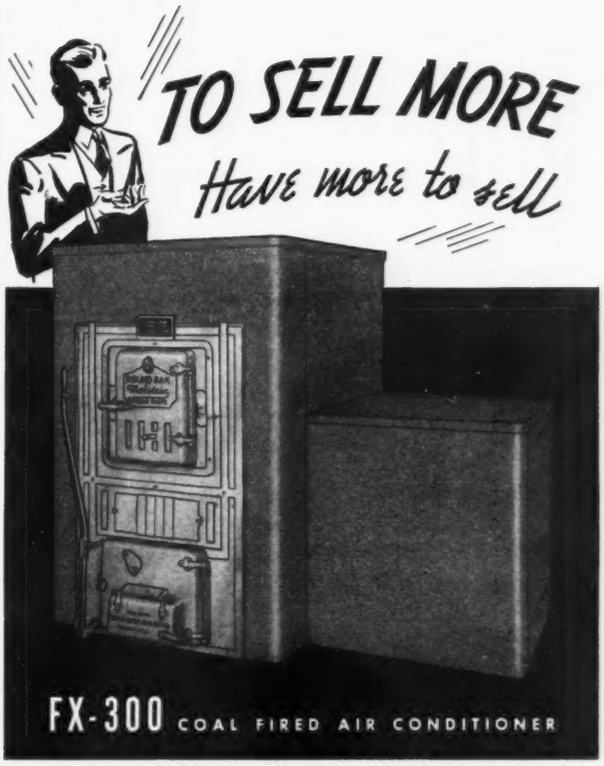
DuraBilt Floor Registers and Intakes are built and *tested* for super-service. Abundant strength is assured by steel cross-bar construction. Cross joints are accurately locked and mortised, end joints interlocked to frame which is itself securely welded and reinforced. Every register tightly and rigidly assembled—all faces level and bars in true alignment. Abundant free air capacity in either standard mesh or narrow mesh design.

▶ *Write for Auer Catalog 39, listing and illustrating complete line of registers, intakes and grilles for all gravity heating and air conditioning purposes.*

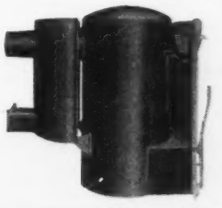
THE AUER REGISTER COMPANY
3608 Payne Avenue Cleveland, Ohio

AUER REGISTERS & GRILLES

For Air Conditioning *and* Gravity



REPORTS from every territory show that Round Oak dealers are hitting new peaks in sales and profits. And the reason for their success is no secret. Never before has the Round Oak line of coal-burning, oil-burning, warm air furnaces and air conditioning equipment been so complete. Never before have Round Oak dealers been able to extend their sales efforts over such broad furnace markets. They are fully equipped to meet every heating requirement in homes of every size. Join them today. If you want to sell more, have more to sell. Take advantage of everything Round Oak has to offer... and you, too, can reap the benefits of new peaks in sales and profits. ROUND OAK COMPANY, DOWAGIAC, MICHIGAN.



MOISTAIR BOILER PLATE

MOISTAIR BLENDED IRON

WRITE FOR LIBERAL FRANCHISE FACTS

ROUND OUT *with* ROUND OAK

THE COMPLETE LINE OF WARM AIR EQUIPMENT

Every heat wave rolls in sales for REX AIRATE dealers!

ATTIC VENTILATION—

—in homes with open attics:—

—the REX-AIRATE "Attik-Pak" model, sturdy, efficient, easy-to-install, provides delightful night air cooling.

—in homes with finished attics:—

—A REX-AIRATE model S, R, or SK can be connected quickly to a window, with a canvas boot, for equally effective summer comfort.

AIR CIRCULATION—

—in commercial establishments:—

Every business man is looking for a way to attract trade on summer dog days. A REX-AIRATE Comfort system makes his store, restaurant, office or theatre refreshingly inviting to old patrons and new—and helps him win greater summer sales.

Dealer Sales Cooperation—

is the keynote of the REX-AIRATE sales program. Mail the coupon today—and earn your share of this worthwhile business.

AIR CONTROLS, INC.,
1933 W. 114th St.,
Cleveland, Ohio.

Name .....

Address .....

City .....State .....

AA-6-39

day-time setting. The result was a fuel saving of approximately 10 percent, but the Research Residence staff believes that this saving in fuel is somewhat offset by more abuse of the furnace resulting from prolonged high firing rates to bring the house up to temperature in the morning. The Research Residence staff suggests that owners of stokers firing coal which is hard to clinker can obtain a clinker by operating with reduced temperatures at night as the prolonged high firing rate in the morning tends to form clinker.

These stoker tests attempted to answer the question of feed rates and firing rates and accordingly the plant was operated at a 40-pound feed rate and an 18-pound combustion rate and in another series of tests at a 27-pound feed rate and the 18-pound combustion rate. At the 27-pound feed rate and 18-pound burning rate, the result was much thinner fuel bed, more ashes, more frequent operating cycles of the stoker and a decreased CO_2 reading. Also a more concentrated fire and larger temperature extremes in the flue gases.

At 27-pound feed rate and 13-pound combustion rate, the result was a reduction in range in flue gas temperature, a better CO_2 reading and less intense concentrated burning.

These tests at the Research Residence were reported in the February and March issues of American Artisan and will be discussed in more complete detail during the coming winter.

Entertainment

Entertainment for visitors was not overlooked. The Chicago convention committee made arrangements for a very enjoyable dinner party and floor show at the Chez Paree on Tuesday night and for a golf tournament at Olympia Fields on Wednesday afternoon.

With the Manufacturers . .

Air Control Products in Chicago

The Chicago Furnace Supply Company, 1278 N. Clybourn Avenue, Chicago, has been appointed Chicago jobber for the Air Control Products, Inc., Muskegon, Michigan, of which Robert L. Leigh is president and general manager.

◆

Dealer Meetings

The Waterman-Waterbury Company of Minneapolis held a series of twelve dealer's meetings at convenient points between May 15 and June 15.

◆

D. Rait Richardson

Word has been received of the passing on May 8th of D. Rait Richardson, former president of Richardson and Boynton Company. Mr. Richardson died in Palm Beach after a short but serious illness. His business life was spent in the furnace and boiler industries and he represented the third generation in the company of which he finally became president. His son, H. T. Richardson, was the fourth generation in that company.

He was one of the founders of the National Warm Air Heating and Air Conditioning Association, and served as a director, vice president and president retiring from the office of president during the World War.

WISE SERIES "A"
GRAVITY FURNACES

"BANNER" PERFORMANCE ON EVERY INSTALLATION

. . . is assured when the installation is made with a WISE Series "A" gravity furnace. Known throughout the trade for long-lasting economical performance it contains such features as the absolutely self-cleaning radiator, air-cell and gas consuming firepot, slip-over front, lower front and ashpit cast in one piece and a cast iron base for square or round casings. These features make the WISE Series "A" outstanding in performance and design.

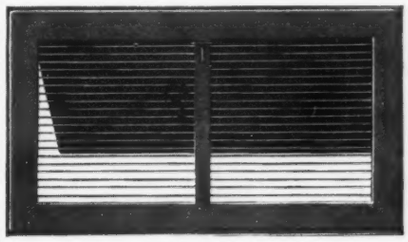
There is a Series "A" furnace for either gravity or air conditioning installations.

Write today for further information on the complete WISE line.

WISE FURNACE CO.
AKRON • OHIO

2 U.S. Air Conditioning REGISTERS Give Genuine Quality for Your Complete Needs in the Lower Priced Classes

For *Directional* Flow



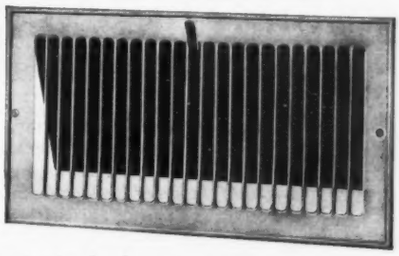
Style 153

Here's the solution to the problem of good quality installations at competitive prices. U. S. Louver Type Registers (style 153 is typical) give you all directional flows and non-vision at exceptionally low cost. **Minimize number of styles by use of U. S. Inset Panels.**

With these popular registers there is complete interchangeability—in all styles—of Band Steel, Studding and Baseboard Frames.

For *Non-Directional* Flow

Style 102



When Non-Directional Flow will serve the purpose and economy is important, use Style 102. This is THE QUALITY **and the only Embossed Bar Design** in the lowest price level.
Style 103 (Perforated—not embossed) is another Design in the Low Priced Group made in a vertical oblong lattice design.

Send for New POCKET MANUAL 27R

U. S. Registers are handled by leading jobbers and distributors of furnaces, registers, and heating supplies including the nation's largest manufacturers of warm air furnaces. Write for the new Pocket Manual No. 27R which shows you all the popular U. S. designs and sizes.

UNITED STATES REGISTER CO.
BATTLE CREEK, MICHIGAN
MINNEAPOLIS • KANSAS CITY • ALBANY
SAN FRANCISCO • NEW YORK, N. Y.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 98.

156—Superfex Air Conditioning Furnaces

Perfection Stove Company, 7609 Platt Avenue, Cleveland, is distributing a 4-page folder (Leaflet R-1339) covering the Superfex oil or gas, 24-hour, air conditioning furnaces.

157—Copper Roofing and Flashing

Revere Copper and Brass Incorporated, 230 Park Avenue, New York City, is distributing a 44-page booklet on copper roofing and flashing, with illustrations and 16 pages of specifications of interest to architects and contractors.

158—Air Conditioning Registers and Grilles

Air Control Products, Inc., Muskegon, Michigan, has just published a new catalog illustrating and describing their air conditoning registers and grilles and damper control sets. List prices are included.

159—Carboloy Masonry Drills

Carboloy Co., Inc., 2979 E. Jefferson Ave., Detroit, is distributing Bulletin GT-103, a small envelope stuffer illustrating and describing their Carboloy masonry drills.

160—Shield Arc Junior Welder

The Lincoln Electric Company, 12818 Coit Road, Cleveland, is distributing a 4-page bulletin—Welder Specification Bulletin No. 314-A—covering the 150 ampere "Shield-Arc Junior" welder, both portable and stationary units.

161—Airconditioners and Oil Burners

Conco-Sampsel Stoker Corporation, Mendota, Illinois, is distributing a 16-page booklet illustrating and describing their oil-fired Airconditioners and oil burners. Special features and specifications are included.

162—Map of New York World's Fair

Hershey Machine & Foundry Co., Manheim, Pa., is distributing a map of the New York World's Fair—a new transit map of greater New York on one side and a map of the fair and approaches on the opposite side.

163—Exhaust and Ventilating Fans

The Emerson Electric Mfg. Company, 1824 Washington Ave., St. Louis, Mo., announces the publication of Catalog X3359—16 pages—illustrating and describing Emerson-Electric exhaust fans, shutters and protective mesh guards, kitchen ventilating equipment and Emerson-Seabreeze kitchen ventilators. Dimensions, performance and prices are included. Where and how to install for maximum benefits and effective size are discussed.

164—Lithoform and Spray-Granodizing

American Chemical Paint Company, Ambler, Pa., is distributing Bulletin No. 7-2-2, covering Lithoform to protect paint on galvanized iron, Galvanneal, zinc-plated steel, cadmium-plated steel and zinc-base castings.

Another bulletin—No. 7-10-S—covers Spray-Granodizing, a protective coating for steel stampings, sheet metal parts, refrigerator cabinets, kitchen cabinets, window-sash frames, road signs, license plates, etc., to be painted or enameled.

165—Electric Fans and Blowers

B. F. Sturtevant Company, Hyde Park, Boston, is distributing Catalog No. 400-7 covering their electric fans and blowers. There are 28 pages covering ventilating fans, propeller fans, Atticvane fans, Wallvane fans, Wind-O-Vane Jr. fans, centrifugal fans, pressure blowers and Big Midget blowers, with capacities and dimensions. Applications of each type is explained and the advantages of one type over another for certain applications is defined.

International *Self Cleaning* Carton Furnace

The International Self Cleaning Carton Furnace is not only self cleaning but offers more heating surface on which the fire shines than any other heater made. There is no place for soot to lodge. It keeps clean forever. It also provides extra heat and reduces heating expenses.

Ten Year Maintenance Agreement

Carton Furnaces are covered by the International Ten Year Maintenance Agreement which protects jobber, dealer, and owner alike from replacements and repairs for a period of ten years. This is the most powerful sales help ever offered the heating trade.

Even Covers Grate Bars

The Ten Year Maintenance Agreement covers all parts, even including grate bars, plus a labor allowance. It acts like an insurance policy, fully protecting the dealer and owner for ten years. Only International dealers can offer such complete protection and International dealers are getting the business. Send for complete information to Dept. A-3.

INTERNATIONAL HEATER COMPANY

UTICA, N.Y., U.S.A.

Western Office and Warehouse, 1933 Wentworth Avenue, Chicago, Ill. • New England Office and Warehouse, 110 Chestnut St., Nashua, N.H.

Stocks carried in Principal Cities throughout the U. S.

Made in ¼", ⅜", ½", ¾", 1", 1¼", 1½", and 2" sizes.

For Top Value, You'll Pick the

BARBER
Gas Pressure REGULATOR

Wherever Pressure Regulators are thoroughly analyzed, tested, and compared—Barber ranks with the best. Regulator *value* is not measured by price alone—Barber is the most economical *quality* Regulator you can buy. All bronze body—brass working parts. Clean cut in appearance—harmonizes with modern styling in gas appliances. Sizes ¼" to 1½" certified by A. G. A. Testing Laboratory. For certainty of dependable service—insist on genuine Barber Regulators.

● Write for complete literature, prices and discounts on the entire line of Conversion Burners, Appliance Burners, Controls and Regulators.

THE BARBER GAS BURNER CO.
3704 Superior Avenue • Cleveland, Ohio

The Barber Gas Burner Company of Michigan
4475 Cass Avenue, Detroit, Michigan

On Duty Every Day
IN **NEW YORK WORLD'S FAIR BUILDINGS**

300 Elgo

Automatic Shutters

The specification of Elgo Automatic Shutters by leading consulting engineers and contractors to meet the ventilation needs of the buildings at the New York World's Fair was not just a happenstance. They selected Elgo Shutters because of their recognized superiority. Why not do likewise? Elgo Shutters are distributed by leading fan manufacturers. See your nearest distributor or write us.

Elgo Ventilating Specialties

Elgo Shutter & Manufacturing Co.
634 W. Warren Ave.
Detroit, Michigan

ONE SURE WAY TO STEP UP YOUR PROFITS FROM FURNACE CLEANING AND REPAIR JOBS... *Include*

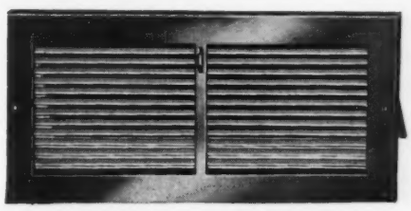
THERMO-DRIP HUMIDIFIERS

• Are you satisfied with the meager profit the average furnace repair or cleaning job might pay? Would ten dollars or more *extra profit* from each of those jobs be attractive? Then include THERMO-DRIP Automatic Humidifiers. They're putting this extra profit into the pockets of hundreds of alert furnace men. Try it. Get the facts about THERMO-DRIP Humidifiers from your jobber or ask us for full particulars.

AUTOMATIC HUMIDIFIER CO.
18th and Main Streets CEDAR FALLS, IOWA

NEW CATALOGUE
NEW REGISTER FACES

The New Rock Island line of Registers now shown in complete new catalogue just off the press.



No. 822 Wall Register—Horizontal Vanes

The New Rock Island Air-Vane Registers are of bar type fabricated construction—Attractive Appearance — Rigid Construction — Vertical or Horizontal Vanes—Simple, secure adjustment.

New Catalogue gives full particulars, prices, etc. Write for a copy.

Rock Island Register Company
Rock Island Illinois

STAR BRAND

FOR EASIER, BETTER RIVETING

Star Brand Rivets mean faster, smoother going on any riveting job —and assure best results.

Precision manufacture and rigid inspection insure accurate sizes and uniform quality.

Rivets are an important trifle. Use the best—Star Brand—the standard of quality for 76 years.

If your jobber or dealer can't supply you—write direct.

COPPER BRAZIERS AND TINNERS' RIVETS
ROUND, FLAT AND COUNTERSUNK HEADS
★ ALSO SPECIALS FROM
BRASS, BRONZE, NICKEL-SILVER
EVERDUR, MONEL, NICKEL
AND OTHER NON-FERROUS METALS

OTHER PRODUCTS
SCREW MACHINE PRODUCTS
STOVE BOLTS - MACHINE SCREWS
MACHINE SCREW NUTS
Special headed & threaded parts made from wire and rod

BLAKE & JOHNSON CO. Est. 1849
WATERVILLE · CONNECTICUT

BLOW HOT BLOW COLD

Forced and conditioned air units impose a new responsibility on asbestos furnace cement.

Avoid complaints and insure permanent satisfaction by depending on the Extra Strength of

LACLEDE FURNACE CEMENT
THE CEMENT THAT
DRIES FASTER
SETS STRONGER
LASTS LONGER

ALSO MAKERS OF
FIREZIST
the new hand moldable plastic lining for use in all types of domestic heating equipment. Write for descriptive literature.

For a permanent and absolutely air and gas tight joint insist on Laclede brand. There's a distributor near you. FREE SAMPLE ON REQUEST. Address . . .

LACLEDE-CHRISTY
ESTABLISHED 1844
St. Louis
411 N. SEVENTH ST.

New Literature . . . .

For your convenience in obtaining copies of new literature, use the coupon on this page.

166—Ventilating Fans

Alco Manufacturing Co., 2619 Milam St., Houston, Texas, is distributing a folder covering Alco attic ventilating fans. Specifications cover four deluxe and four standard fans.

167—Automatic Controls Catalog No. 300

The Mercoid Corporation, 4201 Belmont Ave., Chicago, is distributing Catalog No. 300 with prices effective May 1, 1939 on Mercoid automatic controls for heating, air conditioning, refrigeration and various types of industrial applications. There are 48 pages and cover with index.

168—Cooling Manual

Harvey-Whipple Incorporated, Springfield, Mass., supplied their dealers on May 1st with a loose-leaf manual on room and store cooler sales and installations. The manual embodies suggestions for the complete sales procedure, samples of prepared direct mail letters and gives instructions on how to figure the size of cooling equipment needed for a given job. There are 20 odd charts and illustrations.

169—Welding Award Studies in Book Form

The James F. Lincoln Arc Welding Foundation, P. O. Box 5728, Cleveland, Ohio, has just published "Arc Welding in Design, Manufacture and Construction"—109 original studies of welding by acknowledged leaders in various branches of the industry. The book is arranged as chapters of 10 sections: Automotive; Aircraft; Railroad; Watercraft; Structural; Furniture and Fixtures; Commercial Welding, Automotive Repair, Welderies; Containers; Machinery; and Jigs and Fixtures.

Chapter subjects in the Container Section are: Oil well casing; thimble tube and watertube boilers; 800,000 gallon storage tank; economic type boiler; stationary steel tank; hydraulic turbine scroll cases; steel mill pipe line; penstock of nickel-clad steel; pipe lines for paper board cylinder machine; eliminating flange joints on piping; and modernizing a large brewery with welded piping.

The book contains 1408 pages and 695 numbered illustrations, including photographs and line drawings. A 32-page section gives information regarding the Foundation and the $200,000 Award Program, the Jury of Award's certification of papers for award, an alphabetical listing of authors, in addition to the preface and table of contents. Each section of the book begins on a right-hand page. Facing on the left-hand page are photographs of authors in that particular section. Size 6 x 9 in. Price: $1.50.

FOR YOUR CONVENIENCE

American Artisan, 6 N. Michigan Ave., Chicago, Ill.

Please ask the manufacturer to send me more information about the equipment mentioned under the following reference numbers in "New Products" and "New Literature." (Circle numbers in which you are interested):

89	90	91	92	93	94	95
96	97	98	99	100	101	102
103	104	105	106	107	108	
156	157	158	159	160	161	162
163	164	165	166	167	168	169

Name ..... Title .....

Company .....

Address .....

Are you Manufacturer——Jobber——Dealer——

BIGGER AND BETTER

NEW IMPROVED MODELS

PREMIER FURNACE CLEANERS

Completely Equipped

5/8 Horsepower **69.50**

1 Horsepower **89.50**

Premier's your best buy—whether you're interested in service or profit-making! Bigger bags with larger filtering area and larger, more durable hose mean greater efficiency and longer wear. The motor can be used independently for suction and blowing in cleaning air ducts, registers, grills, radiators, filters, and air-conditioning equipment.

Motor specifications—Model 174, 5/8 horsepower, maximum vacuum, 35 inches in water—Model 175, 1 horsepower, maximum vacuum, 46 inches in water.

Business-getting return postcards furnished to dealers at low cost. Write for complete details today.

ELECTRIC VACUUM CLEANER CO., INC.
1734 Ivanhoe Road · Cleveland, Ohio

The World of Tomorrow

has been developed by

Experience

of the

World of Yesterday

When you visit the New York World's Fair you will see that R&G products are in *world-wide* use. They are shown in the following buildings:

New York City Exhibit Bldg.
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Czechoslovakia Exhibit Bldg.
Poland Exhibit Bldg.
Rumania Exhibit Bldg.
Netherlands Exhibit Bldg.
U. S. S. R. Exhibit Bldg.
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American Tel & Tel.
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Art Building
Beech-Nut Packing
Canada Dry
Communications
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Crosley Radio
Du Pont
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Firestone Tire
Food
Gas Exhibits
Glass Bldg.
General Cigar
Heinz
House of Jewels
Johns-Manville
Marine
National Biscuit
National Cash Register
Petroleum
R. C. A.
Railroad Bldg.
Restaurants
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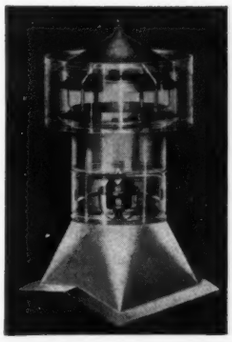
Register & Grille Mfg. Co., Inc.
70 Berry St. Brooklyn, N. Y.

Look to BURT

for Quality, Service and Prices in Roof Ventilators

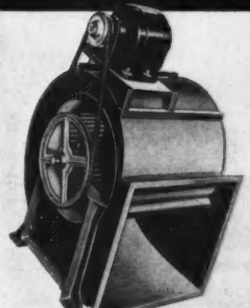


The Burt line gives you everything you need to bid successfully on those closely figured competitive jobs. You not only make a nice profit but Burt quality and service will satisfy your customers and hold them in line for repeat business. If you are figuring on Public Works Administration business, the Burt line will give you a definite advantage.

Write for catalogs.

THE BURT MFG. CO.
Roof Ventilators - Oil Filters - Exhaust Heads
301 Main St. Akron, Ohio

NOW READY!
The Complete New
PACIFIC
BLOWER LINE FOR 1939



All types and sizes

For Modern Forced Air Heating, Ventilating and AIR-CONDITIONING

26 SUCCESSFUL YEARS

. . . and Still Growing!

Pin to your letterhead . . Mail today.
Pacific Gas Radiator Co. (Dept. AA-6)
1740 W. Washington Blvd., Los Angeles
Send complete literature and prices on—
.....
.....
Name.....
Address.....

FLOOR FURNACES • FORCED AIR UNITS

Pacific

BASEMENT FURNACES • UNIT HEATERS

Extra Profit selling a RELIANCE TIME SWITCH with every ATTIC FAN!

You know there's real money to be made in the attic ventilation field, and we'll tell you how to get *extra profits* on every attic fan you install. A Reliance Time Switch is just the thing to make the job complete. Show the homeowners how it will turn the fan on *and* off without attention, and you'll have your jobs sold in no time.

Reliance switches sold in connection with your attic fans will earn you handsome profits season after season. Write today for further information.

RELIANCE AUTOMATIC LIGHTING CO.
1929 MEAD STREET **RACINE, WISCONSIN**

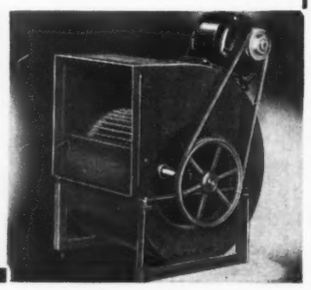
P. S. They'll soon pay for themselves by saving hours of unnecessary operation, too!

9 Models UTILITY Air KOOLERS

Complete evaporative coolers with Utility Blowers, "No-Sag" pads, self-contained water re-circulator.

UTILITY BLOWERS

Dynamically balanced, self-aligning bearings, die-formed, baked enamel finish, single or double inlet.



UTILITY FAN CORP.
2528 Santa Fe Ave., Los Angeles, Calif.
122 E. 42nd St., New York, N. Y.

Toledo, Ohio Ordinance

(Continued from page 73)

ers shall be provided with positive locking devices. Friction head dampers may also be used.

Supply Air Registers

Section 509. All supply registers shall be made of metal and shall be securely fastened to connecting boxes, and shall be thoroughly sealed to prevent streaking of walls. It is recommended that warm air registers be of vertical open space, diffusional, multiflow design. The free area of all supply registers shall be such that the velocity through the openings will not exceed that permitted in Section 508. Return registers shall be made of metal. The free area of all registers shall be fully equal to the free area of the ducts to which they are connected.

Duct Construction

Section 510. All ducts in mechanical warm air systems shall be constructed of U. S. Standard gauge galvanized iron as follows: up to 12" wide, No. 26 gauge; 13" to 30" wide, No. 24 gauge; 31" to 48" wide, No. 22 gauge; 49" to 60" wide, No. 20 gauge; 61" to 90" wide, No. 18 gauge. The above gauges shall also apply for round ducts of diameters equal to the width above stated. Number 28 gauge iron may be used in ducts, stacks, and boxes of not exceeding 14 inches, greatest dimension, in residential systems. No duct less than 6" round or of equal area in rectangular, shall be used in any system. All ducts of more than 24" in width shall be securely and properly supported and braced to provide permanent and rigid construction.

Section 511. All elbows shall be of true and even curve and shall be provided with diffuser vanes where necessary to maintain even velocity. All joints and seams shall be so constructed that they will be as nearly air tight as is possible. Ducts may also be of masonry construction, provided, however, that the inner surfaces shall be smooth, and, that all turns shall be even curves.

Section 512. Size of Furnace shall be determined by calculating the total heat loss of the building to be heated, and, add to this requirement, twenty-five (25) per cent as a safety factor. The certified capacity of the furnace as published in the manufacturer's data shall be accepted and in each case the furnace shall have a capacity twenty-five per cent in excess of the requirement of the building.

Controls and Regulators

Section 513. All mechanical warm air heating systems shall be equipped with automatic controls capable of regulating the operation of the system within the temperature range as herein specified.

Section 514. The draft dampers in a hand fired coal furnace shall be controlled by a regulator known as a room thermostat, or, a regulator which controls the draft by plenum chamber or "bonnet" temperature approved by the Division of Inspection. Each room thermostat control apparatus must contain a high limit control, and shall set the draft dampers to "check" position in the event of energy failure.

Section 515. Gas, Oil, or Coal Burners (Stokers) shall be regulated by a room thermostat with a high limit control, or, by plenum chamber or "bonnet" temperature control when used in warm air heating systems.

Blower or Fan Control

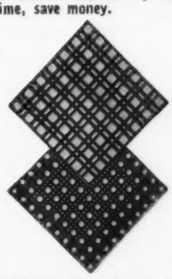
Section 516. The Blower or fan in each forced air system shall be controlled by a Furnastat in the Plenum chamber, or, by a line voltage room Thermostat. When a line

REGISTERS and GRILLES

No. 3320 REGISTER WITH INDIVIDUAL ADJUSTMENT OF GRILLE BARS—45° TO THE LEFT OR RIGHT.

Standard Stamping presents to the heating and air conditioning trade a striking new line of registers and grilles for gravity warm-air heating, air conditioning and ventilating systems. Modern in appearance and far better than average in performance, they offer the contractor an unusual opportunity to add the final touch to a good job, and at the same time, save money.

A complete catalog containing time saving charts and tables as well as the full line of "Standard Air-Control" registers and grilles is now available and will be sent on request. Write for your copy today!



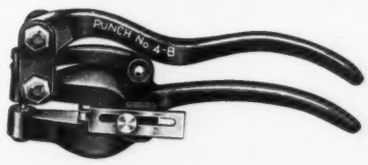
PERFORATED METALS

Screens and grilles for many industrial purposes such as sorting, sifting, and light fancy panels. We have a complete line for almost any use.

WRITE for CATALOG!

STANDARD STAMPING & PERFORATING COMPANY
3131 W. 49th Place **Chicago, Illinois**

A REAL *Time Saver*



The No. 4B PUNCH by *Whitney*

This punch is accepted by leading contractors and dealers as a real time-saver in the shop and on the job. Men who use it every day know it can't be beat for clean, fast punching. Has a capacity of 1/4" through 16 ga., weighs 3 pounds, 8 1/2" in length, depth of throat, 2". Complete tool includes three punches and three dies of specified sizes with die adjusting key.

W. A. WHITNEY MFG. CO.
636 RACE ST. ROCKFORD, ILL

AJAX

A NEW LINE OF PREFABRICATED DUCTS and FITTINGS *for* Forced Air and Air Conditioning Installations

Our Catalog "A" (Gravity Fittings), Catalog "B" (Forced Air Fittings) are yours on request.

THE CINCINNATI SHEET METAL & ROOFING CO.
Furnace Fitting Department
230 E. Front St. Cincinnati, Ohio

Your Key, to His Basement Door!

THE man who owns a Super heating plant cleaner, gets into any basement in town. While there he sells new plants, re-sets, grates, repairs, his whole line and his services. He gets good money just for his visit, too. The Super Plan Book tells you how. The Super machine makes it come true.

Why not find out how thousands make good money, cleaning heating plants with their Supers?

-------USE THIS COUPON-------

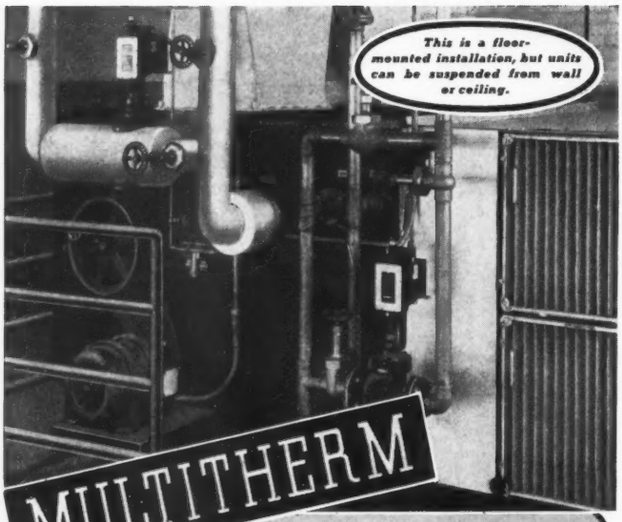
The National Super Service Company
1944 N. 13th Street, Toledo, Ohio

Send me the Plan Book and complete information about your free trial and the new low-priced Super.

Name .....

Street Address .....

City and State .....



MULTITHERM

Conditioning Units

Simplified—Compact —Easily Installed —Quiet Operation

Ideal for Stores, Theatres, Restaurants, Offices, etc.

Last word in low-cost air conditioning. Backed by 25 years' experience. Wide range of combinations—a unit of proper size and capacity for practically any cooling, heating or complete conditioning need. Quiet in operation.

SIZES UP TO 13,600 CFM. Write for Bulletin 107.

COMPLETE AIR CONDITIONING · VENTILATION · HEATING · COOLING · MECHANICAL DRAFT FANS & BLOWERS FOR INDUSTRIAL NEEDS

CLARAGE FAN COMPANY • Kalamazoo, Mich.
SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES

"SO BUSY HAD TO STOP SELLING"—

"Gentlemen:

"You asked me why I did not get more sales last October and you mentioned that I have sold quite a few jobs in September and November, and only one in October.

I sold so many jobs in September that I just got so busy I had to stop selling and get the furnaces installed.

My men were not putting them in as fast as I could sell them so I had to help.

My plans are for next year that this won't happen again."

Sincerely yours,
XYZ
. . . . . Illinois.

Complete information; name, address of writer of above letter furnished on request. Phone, wire or write The Williamson Heater Company or nearest jobber. Representative will call within 24 hours.

FREE: Complete, easily understood short method for figuring air conditioning jobs. You can complete your figures, price job in one hour flat. Write Dept. 2.

THE WILLIAMSON HEATER COMPANY
Cincinnati, Ohio

TRIPL-LIFE Complete Line Quick Service FLO-WARM

You can triple your profits with "Tripl-ife"

voltage thermostat is used to control the blower, then, the firing apparatus shall be controlled by a plenum or "bonnet" temperature control. A plenum or "bonnet" temperature control is in itself a high limit control and therefore shall be accepted as such. It shall be unlawful to operate a forced air system unless all controls are completely installed and are in working order.

Section 517. Any casing or top of an oil or gas fired automatically controlled furnace shall be provided with at least one and one-half (1½) inches of magnesia or equivalent incombustible insulation. Any coal fired furnace casing or top coming closer than six (6) inches to a combustible ceiling or joists shall be provided with at least one and one-half (1½) inches of magnesia or equivalent incombustible insulation in addition to a metal shield.

◆

Comfort Cooling For Stores

(*Continued from page* 52)

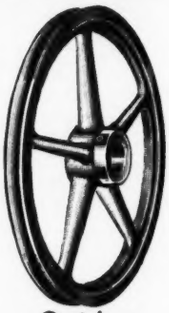
need for ventilation—if not in all, at least in some part of its activities.

A few suggested applications may be of service to refresh your memory and make you realize the broad field to be covered—

Schools	Pressing Shops
Restaurants	Hotels
Kitchens	Stores
Barber Shops	Machine Shops
Offices	Woodworking Shops
Box Factories	Boiler Rooms and
Sugar Refineries	every class of Indus-
Oil Refineries	trial and Commercial
Laundries	Establishment

MAUREY V-PULLEYS Solve F. H. P. Transmission Problems

THE New MAUREY Cast Iron V-Pulley will be found particularly efficient when used with Blowers and Air Conditioning Equipment. Tests prove that its new scientific design—five specially shaped spokes—give less resistance to the flow of air in these installations than the ordinary pulley. It is exceptionally sturdy, well balanced and true running. Available in seven sizes—7.2" to 14.2" O. D.



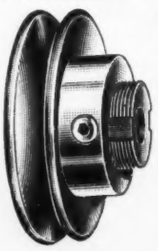
Cast Iron

MAUREY Steel V-Pulleys are well known for their trouble-free service with F. H. P. installations in Stokers, Fans, Air Conditioning and Refrigeration Units.

Made of STEEL with heavy rolled edges giving extra sturdiness. Hubs are machined steel or malleable iron, not die cast. Carried in stock in a wide variety of sizes for both "A" and "B" belts.

WRITE FOR CIRCULARS GIVING PRICES AND DESCRIPTIONS.

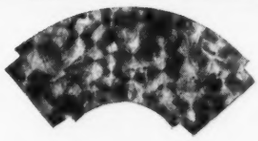
MAUREY Variable Pitch Diameter Pulleys

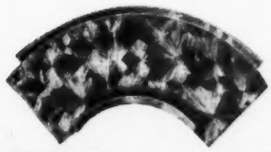


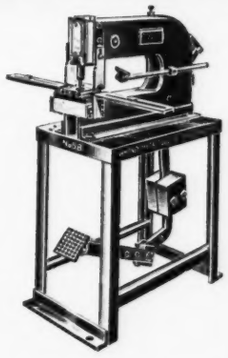
Solid steel construction. Adjustment permits speed variation of as much as 30%. Fine, accurate, milled threads, 20 to the inch, assure close adjustment. Designed for Air Conditioning Units. Solid steel—not die cast. Made in 4 sizes, 3¼" to 4½ inches in diameter.

MAUREY MANUFACTURING CORP.
Wabash at 29th, Chicago, Illinois

BENDING BRAKES **WHITNEY-JENSEN** METAL TOOLS







ELBOW CHEEKS

can be blanked and formed cheaply on a

No. 58 FOOT PRESS

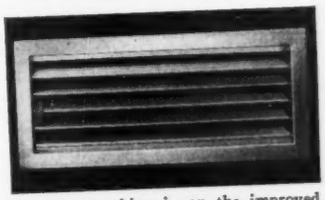
25 YEARS TRADE W MARK SHEET METAL TOOLS

Note: Above illustration of No. 58 Foot Press does not show Elbow Cheek blanking and forming dies.

● Substantial savings can be effected in the making of duct elbows by cutting out and edging the cheeks on a No. 58 Foot Press equipped with special blanking and forming dies, producing completed cheeks in two quick and easy operations. Write for further information.

WHITNEY METAL TOOL CO. ● 91 Forbes Street, Rockford, Illinois

For DEALERS who want More Business—



Waterloo dealers are cashing in on the improved Waterloo line. Dealer's sales are the highest in our history. And the reason is simply that Waterloo Registers deliver more beauty, more real performance, more flexibility, and more features.

It costs nothing to find out

so write today for your Free Waterloo Catalog that tells all about this fast-selling line.

WATERLOO REGISTER CO.

WATERLOO, IOWA SEATTLE, WASH.

Representatives in Principal Cities

WATERLOO REGISTERS

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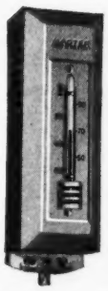

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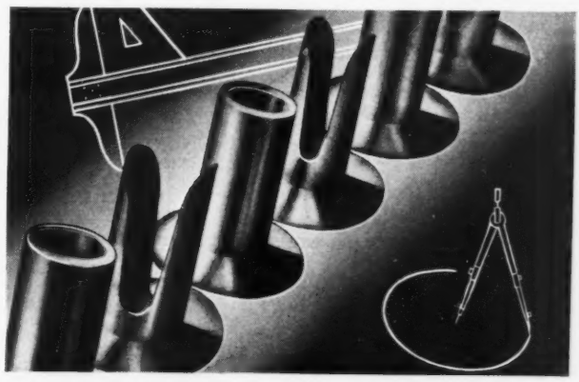

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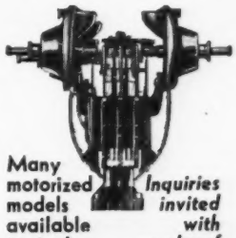

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Sound Control

(*Continued from page* 48)

stalled so that the canvas cannot tighten, but will remain flexible enough to take up any vibration of the fan and prevent transmission of vibration to the duct. Avoid painting the canvas, as paint causes the canvas to lose its flexible qualities. Canvas connections may be located in the duct after the first section has been attached directly to the fan, if conditions do not permit placing canvas at the fan. Where space and construction conditions do not permit the use of a canvas connection, a felt packing approximately ½-inch thick placed inside between the duct and the fan discharge outlet or the intake collar, may be substituted. When this method is employed, be sure to support the duct independent of the fan, so that the felt separates the duct from the metal of the fan.

Flexible connections for kitchen exhaust fans should be made with asbestos cloth in place of canvas, to withstand heat. For fans handling acid fumes, use special moulded rubber sections of the same dimensions as the duct.

The type and extent of the sound absorbent material required for any particular installation, depends on the intensity of the noise.

Acoustical engineers advise lining the duct for a distance of at least ten times the average of its cross sectional dimensions. For example, a duct 18 inches by 24 inches should be lined for a distance of at least 17 feet 6 inches. However, it must be kept in mind that no definite formula is applicable to all cases. For installations where the ducts are unavoidably short, sound traps or a series of partitions of sound absorption material must be provided. A large duct would in this manner be divided up into a number of smaller ones, in order to present sufficient acoustically treated surface to the air flow. One-half inch thick air acoustic sheets is in most cases sufficient, or ½-inch acoustic felt may be used if a fireproof material is not required. For installations requiring exceptionally low frequency absorption, use the 1-inch thick air acoustic sheets.

It is advisable to select acoustical material that is fireproof and moisture resistant, as well as one that possesses good sound absorbent qualities.

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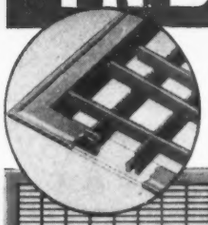

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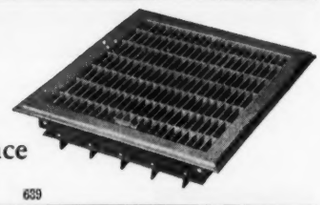

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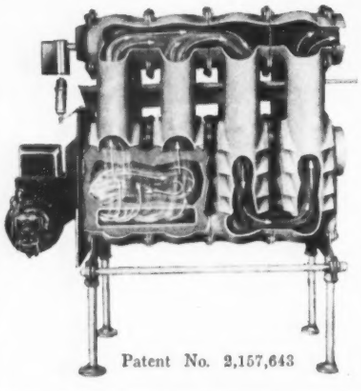

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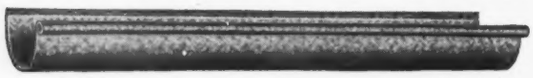

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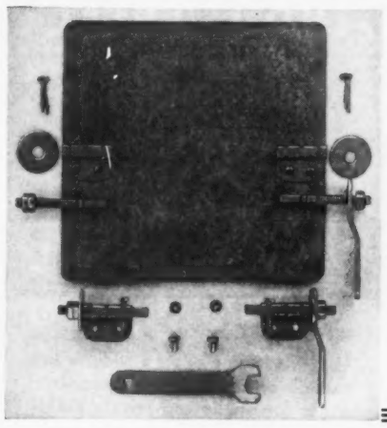

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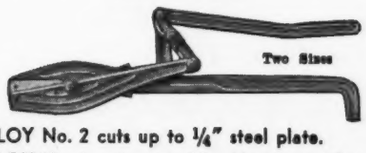

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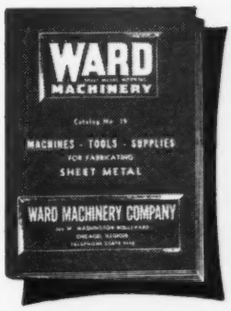

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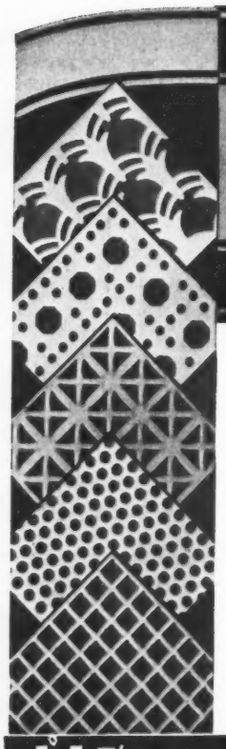

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Neubecker's Pattern For a "Y" Branch

(*Continued from page* 46)

near *D* and intersect it by an arc struck from *7* as center, with *L, D-7* in the true lengths as radius. Draw lines in the pattern from *C* to *D* to *7*.

With radii equal to *L 3-2* and 1 in the true lengths and with *B* in pattern as center draw short arcs near *3, 2* and 1. Again set the dividers equal to the divisions between *4* and 1 in the quarter end view and starting from point *4* in the pattern step to arcs *3-2* and 1. Draw a line from 1 to *B*. With *B-A* in the quarter end view as radius and *B* in pattern as center, draw a short arc near *A* and intersect it by an arc struck from 1 as center with a radius equal to *L-A*-1 in the true lengths.

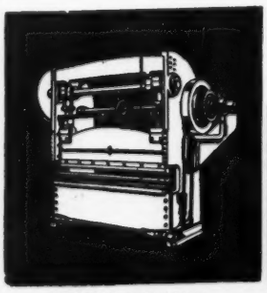
Draw lines from 1 to *A* to *B* in the pattern; also draw the irregular curved line through points 1 to *7*. *A-D-7*-1 then represents the one half net pattern for one branch of the "Y". As both branches are alike, four half pattern shapes will be required to assemble the full "Y" branch.

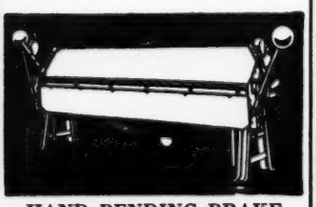
Locks, Seams, Etc.

Allow locks along *B-C-D* for drive cleat connections, turning them outward as indicated in diagram *F*. Also allow edges along the irregular curve 1 to *7* for double seaming to the round collars marked *a* in the plan in Fig. 38. Along the seam lines *A*-1-*D-7* in the pattern in Fig. 39 allow locks for grooving purposes. Where the "Y" branch connects to the rectangular duct along *e-e'* in plan in Fig. 38, drive cleats or regulation S slips can be used. Either slip makes a rigid joint.

When forming the transition pattern shape shown in Fig. 39 very slight bends are made in the brake along the heavy lines with dots. Where the joint takes place at the splitter end *S* in side elevation in Fig. 38 a clinch seam is made as indicated in diagram *T* at the left of *S*. Here the lower end of one inner side of the transition has a raw edge as at *b* and the opposite inner side a clinch edge as shown at *c*.

These two, raw and clinch edges are also shown by *b* and *c* respectively in the pattern shape in Fig. 39. The second type "Y" branch where the "V" or splitter is omitted, will be demonstrated in the next solution.





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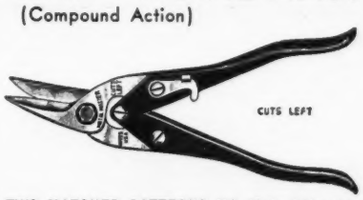

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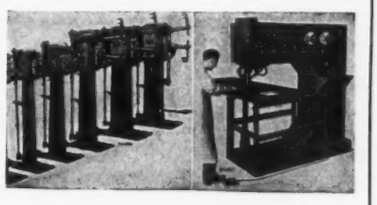

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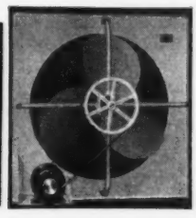
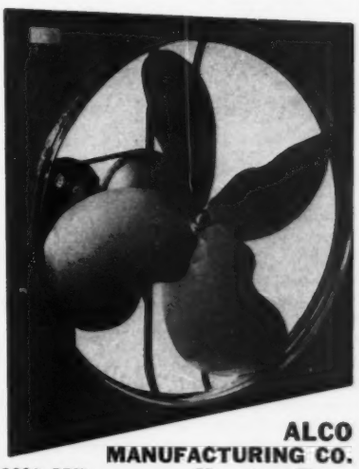


Low Cost, Summer Comfort-Cooling
Special design 3 bladed fan with rubber mounted ball bearings and rubber mounted motor provides extra QUIET operation! Certified air capacities! New bulletin just out describes and illustrates how system operates! Write for your copy, NOW!
AUTOVENT FAN & BLOWER CO.
1807-19 N. Kostner Ave., Chicago, Ill.

The American Artisan Service Section presents a golden opportunity to contact a national circulation at comparatively small cost. Manufacturers can use it to make any article sell and dealers will find it an inexpensive way to contact a live buying trade. Don't delay—send in your copy now for the next issue. See bottom of page for rates.

ATTIC VENTILATION



ALCO MANUFACTURING CO.
2619 Milam Houston, Texas

STRAIGHT—CIRCULAR—IRREGULAR CUTTING OF SHEET METAL

BEVERLY cuts flat to any size or shape. Three sizes: No. 1, weighs 16½ lbs.; cuts up to 14 gauge. No. 2, weighs 32 lbs., cuts up to 10 gauge. No. 3 weighs 55 lbs., cuts up to 3/16 gauge.

Write for circulars and prices.

BEVERLY THROATLESS SHEAR CO.
3004 W. 111th St. Dept. 2 Chicago, Illinois

Save Money, Time and Muscle
Drill Concrete with the "Do-All" Combination Electric Hammer and Drill. Set expansion bolts 10 to 20 times faster than with hand tools. Drills concrete, brick, stone, metal, wood. 2 tools in 1. Easy to maintain—Pays for itself. Bulletin No. 381.
WODACK ELECTRIC TOOL CORPORATION
4644 W. Huron St., Chicago, Ill.

BLOWER FAN HOUSINGS
of
Standard Dimensions

Individual parts or complete units. Housings for wheel sizes 4½" to 9".
Send for Blow-Aire Blower Housings bulletin, it shows detail drawings and gives dimensions along with other important information.
DETROIT STAMPING CO.
Established 1915
3465 West Fort St. . . . Detroit, Mich.

SERVICE SECTION: Rates for display space similar to above in Service Section are $5.00 per inch per insertion. One-inch minimum space accepted. **Classified Section:** Rates for classified advertising are 5 cents for each word including heading and address. Count seven words for keyed address. Minimum $1.00 for each insertion. Cash must accompany order.

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RUN DOWN THE FACTS

There are various catch phrases used these days in the featuring of thermostats. The claims implied in these phrases should merit your investigation. ✣ Run down the facts and make your decision accordingly. ✣ The Mercoid Sensatherm invites a critical comparison. Its unique construction and manner of operation are responsible for the unusual record of sensitivity and positive performance in maintaining an even room temperature over a long period of years. ✣ The neatness of its design and pleasing Alumilite finish blend in with most any type of interior decoration. ✣ For detailed description send for new catalog, No. 300.

THE MERCOID CORPORATION

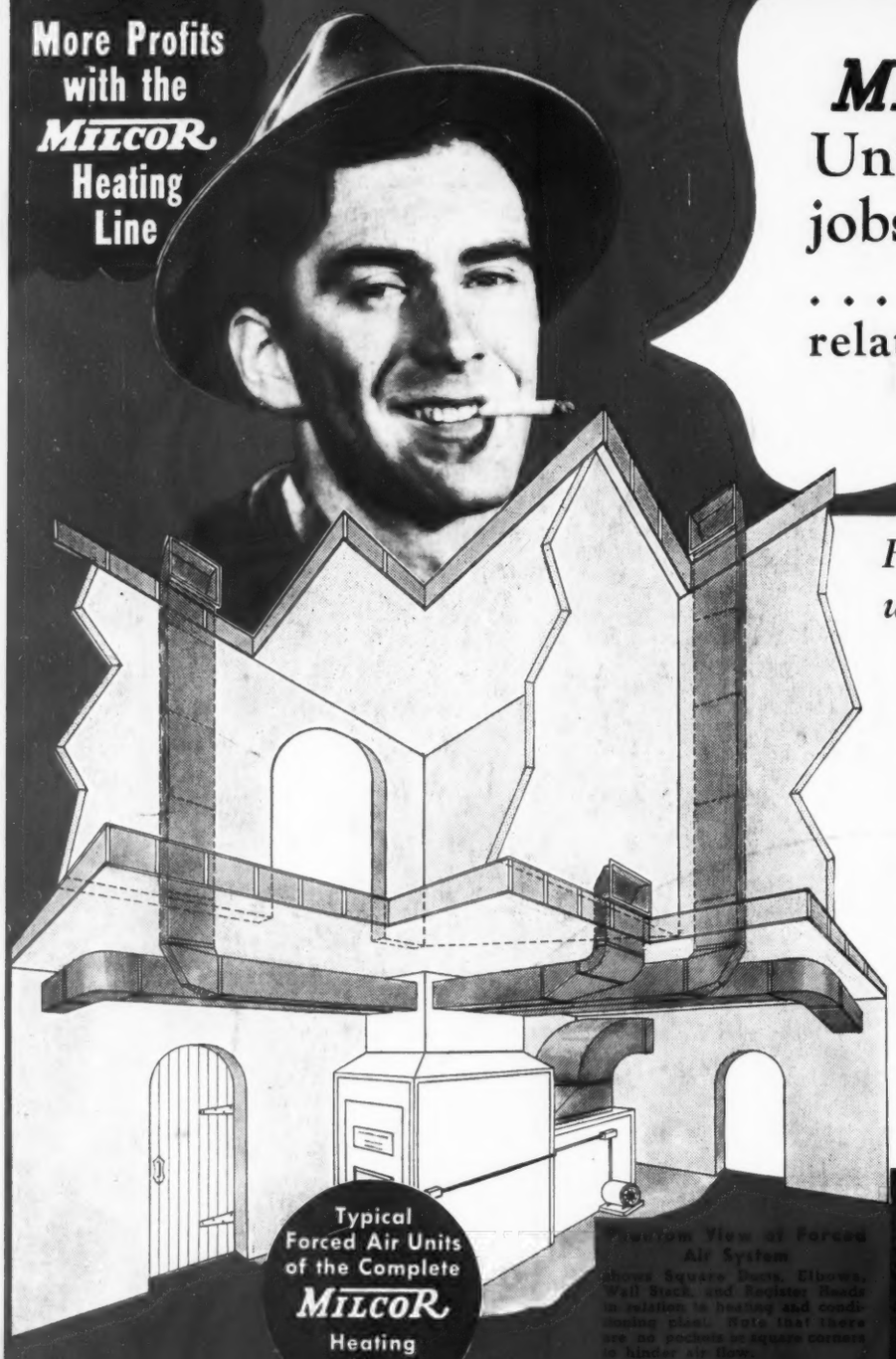
4201 BELMONT AVENUE ✣ CHICAGO, ILLINOIS

Illustration shows Mercoid Sensatherm in actual size

More Profits with the MILCOR Heating Line

MILCOR Forced Air Units help us get more jobs and bigger profits

. . . *because this* complete, related system *meets* almost every condition



Typical Forced Air Units of the Complete MILCOR Heating Line

Forced air problems don't "stump" you, when you rely on this complete line

The Milcor Forced Air Line puts you in a position to make more money, with a complete "family" of products that help you meet almost every condition in working with air conditioning plants, trunk line systems, and other types of heating installations using forced air.

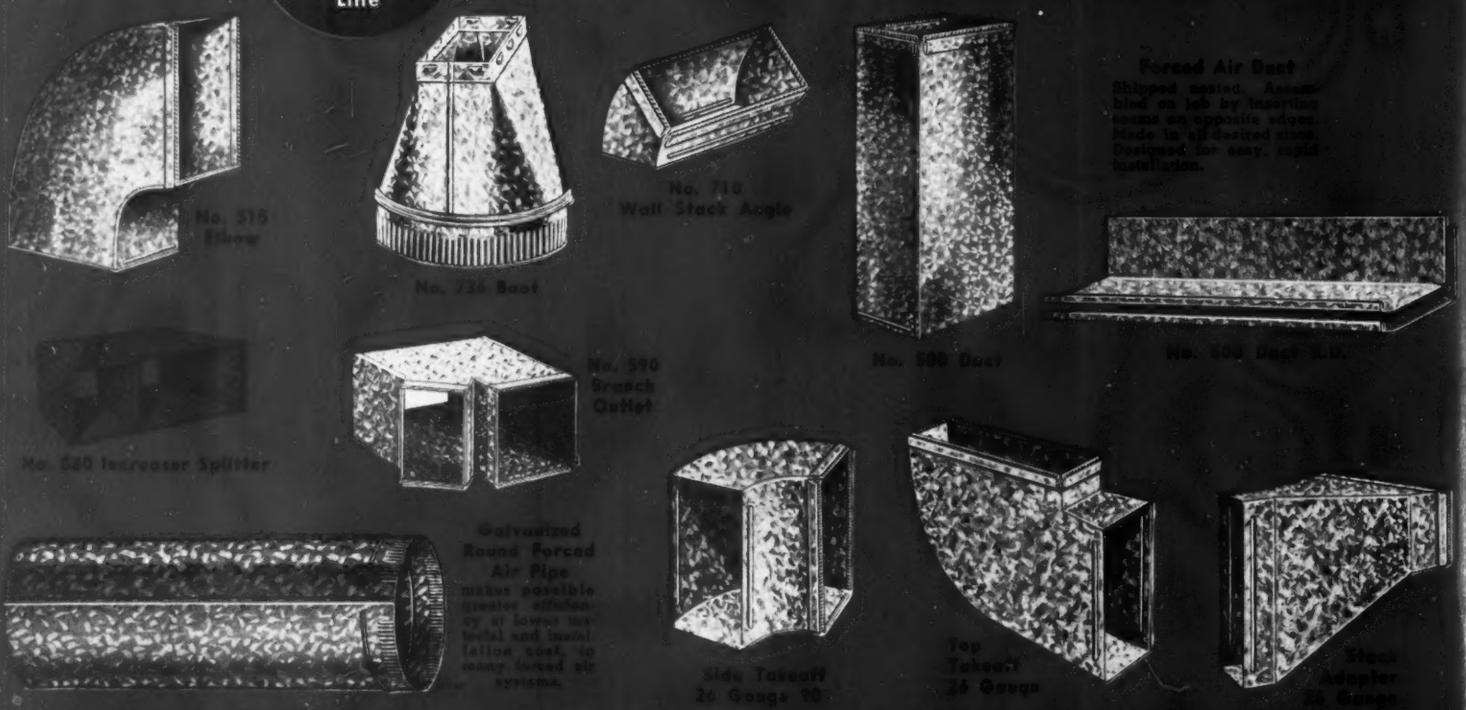
This related system of standard parts, engineered to work together, eliminates much confusion and waste of time, effort, and materials . . . gives you assurance of good results *every time*—jobs that are completed smoothly, quickly, and *profitably*.

Milcor's strategically-located plants are equipped to give you speedy service. Every item in your order is *right*, so you can give customers a good-looking, safe, satisfactory job and make them willing to recommend you to others.

Join the many sheet metal men who are enjoying more work and bigger profits — use Milcor on all your forced air jobs. Write for free, colorful Milcor Forced Air Book today.

MILCOR STEEL COMPANY

MILWAUKEE, WISCONSIN — CANTON, OHIO

CHICAGO, ILL., KANSAS CITY, MO., LA CROSSE, WIS., ATLANTA, GA., NEW YORK, N. Y., ROCHESTER, N. Y., BALTIMORE, MD.

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